SEPTEMBER 1940 Thirty-Five Cents Per Copy

Next month Coal Age presents its 20th Annual Model Mining Number, filled to the covers with operating information gathered from the highly efficient mechanized mines of southern Illinois. Facts and figures in this issue prove, for every phase of operation, that modern equipment plus man-power plus management equals increasing output per man-day—and that's the answer all coal men want today, and for the future. . . . **With this number** we are expanding in two directions our departmental service on run-of-mine operating problems, p. 62-65; (1) fast reading discussions of specific practices, kicking off with an exploration into the neglected subject of sounding roof, face, and ribs, by Johnny Jones; (2) a revival of the popular "Mine Foremen's Examination Questions and Answers." . . . **Coal and near-coal separation,** by sink-and-float method, solves with accuracy the difficult cleaning problem at Weston Breaker. How it determines the borderline after the broader classification has been made in the main breaker, will be told in an

(CONTINUED ON PAGE 7)

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Coal Age

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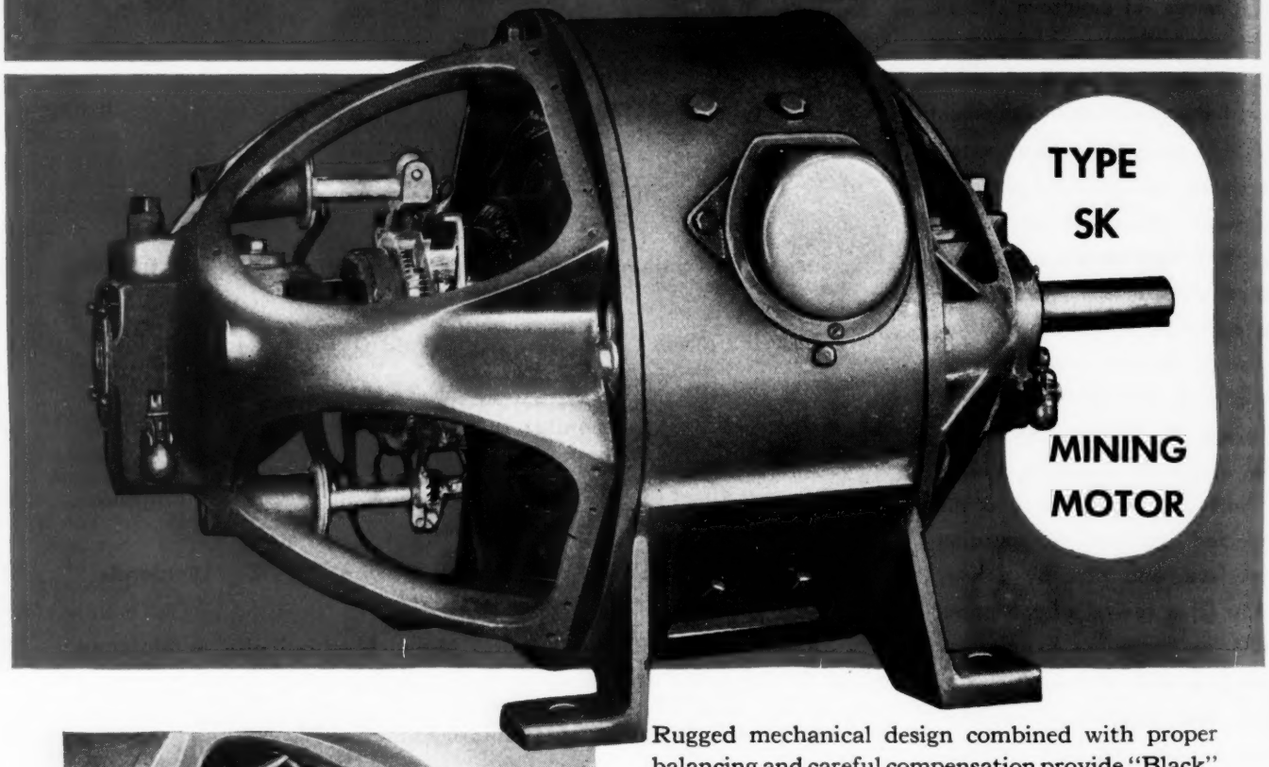
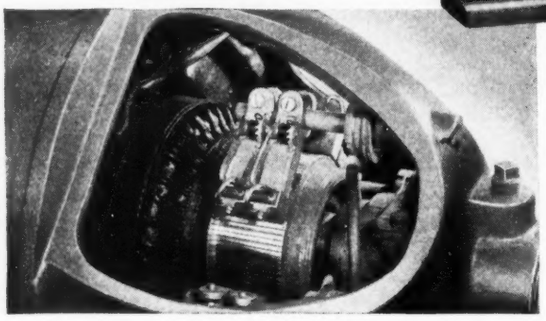
"black" commutation

UNDER SEVERE OVERLOADS





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WESTINGHOUSE ELECTRIC & MANUFACTURING CO., EAST PITTSBURGH, PA.

Westinghouse SK Mining Motors

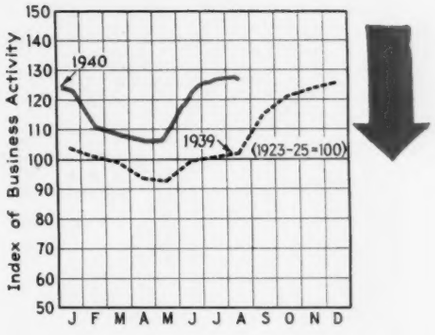
(CONTINUED FROM PAGE 5)

early issue. . . . **West Virginia, here we come,** three in this issue and one soon afterward. Packed full of food for thought and action, the résumé of the **State's Mine Inspection Report Form,** by N. P. Rhinehart, p. 37, points the way to close in on chance takers by listing 479 unsafe practices. Table II proves its worth. **Modernization ups efficiency,** at Puritan mine, states Jack Edwards, p. 59, and then goes on to tell why. Cuts power cost, too. **Scooters** in coal too thin for mobile loaders offers a solution to many operators. Delivering 9 tons per man-shift to main sidetrack in 30- to 34-in. coal is good, but it's only dubbed "experimental" to date at Gauley Mountain Coal Co. How **conveyors win** over difficult natural conditions at Beckley Fire Creek's new Penman mine will be detailed later on. . . . **What a mine worker thinks** of management and its policies is simply told by loading machine operator Gault Hellein, p. 40, for all to read. Searching in his reasoning and forthright in his expression of opinion, the common causes of underground management failures to produce more, and safely, are neatly placed on the bosses' shoulders. . . . **Front cover space** this month was released for editorial use by Hulburt Oil & Grease Co., whose advertisement occupied that spot last September.

HOW'S BUSINESS

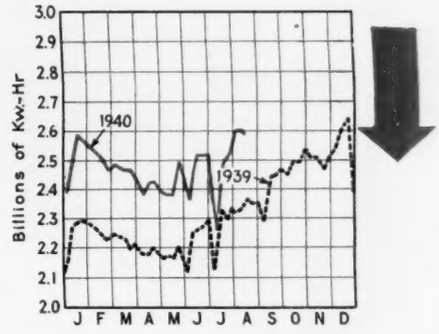
GENERAL BUSINESS CONDITIONS

Business statistics show some signs of fatigue after the rapid rise beginning in early April, according to *Business Week*, whose index declined 1½ points to 126.6 during the week ended Aug. 17. Business men apparently have already discounted the possibility of defeat for Britain in the war, our own national defense program being expected to provide a cushion for business for months to come. The recent advance is seen as a "durable goods recovery," other goods not keeping pace.



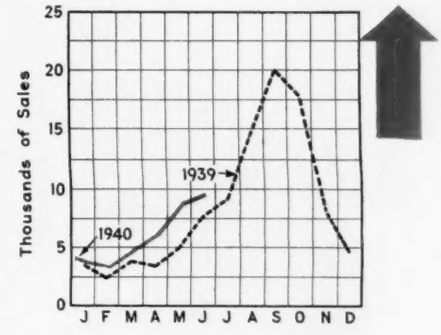
ELECTRICAL POWER OUTPUT

Production of electric energy by the electric light and power industry for the five weeks since our last report, according to the Edison Electric Institute, was: week ended July 13, 2,483,000,000 kw.-hr.; July 20, 2,524,000,000; July 27, 2,601,000,000; Aug. 3, 2,605,000,000; Aug. 10, 2,859,318,000 kw.-hr. Though output for the most recent week was slightly under the year's high of the preceding week, it was 11.0 per cent above the corresponding week of a year ago.



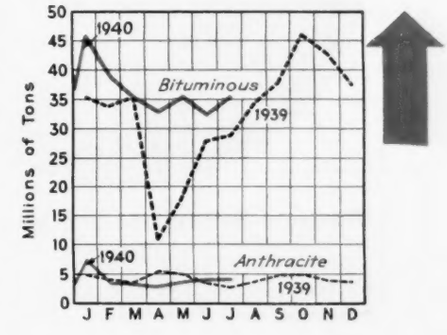
COAL STOKER SALES

Mechanical stoker sales in the United States in June last totaled 9,986 units (U. S. Bureau of the Census from 107 manufacturers), compared with 8,415 in the preceding month and 7,943 in June, 1939. Sales of small units in June last were: Class 1 (under 61 lb. of coal per hour), 9,124 (bituminous, 8,143; anthracite, 981); Class 2 (61-100 lb. per hour), 351 (bituminous, 333; anthracite, 18); Class 3 (101-300 lb. per hour), 294.



COAL PRODUCTION

Bituminous coal produced by United States mines in July last (preliminary) totaled 36,080,000 net tons, according to the Bituminous Coal Division, U. S. Department of the Interior, which compares with 32,340,000 tons (revised) in the preceding month and 29,391,000 tons in July, 1939. Anthracite tonnage in July last was 4,415,000 (preliminary), according to the U. S. Bureau of Mines, against 4,367,000 (revised) in the preceding month and 2,951,000 tons in July, 1939.



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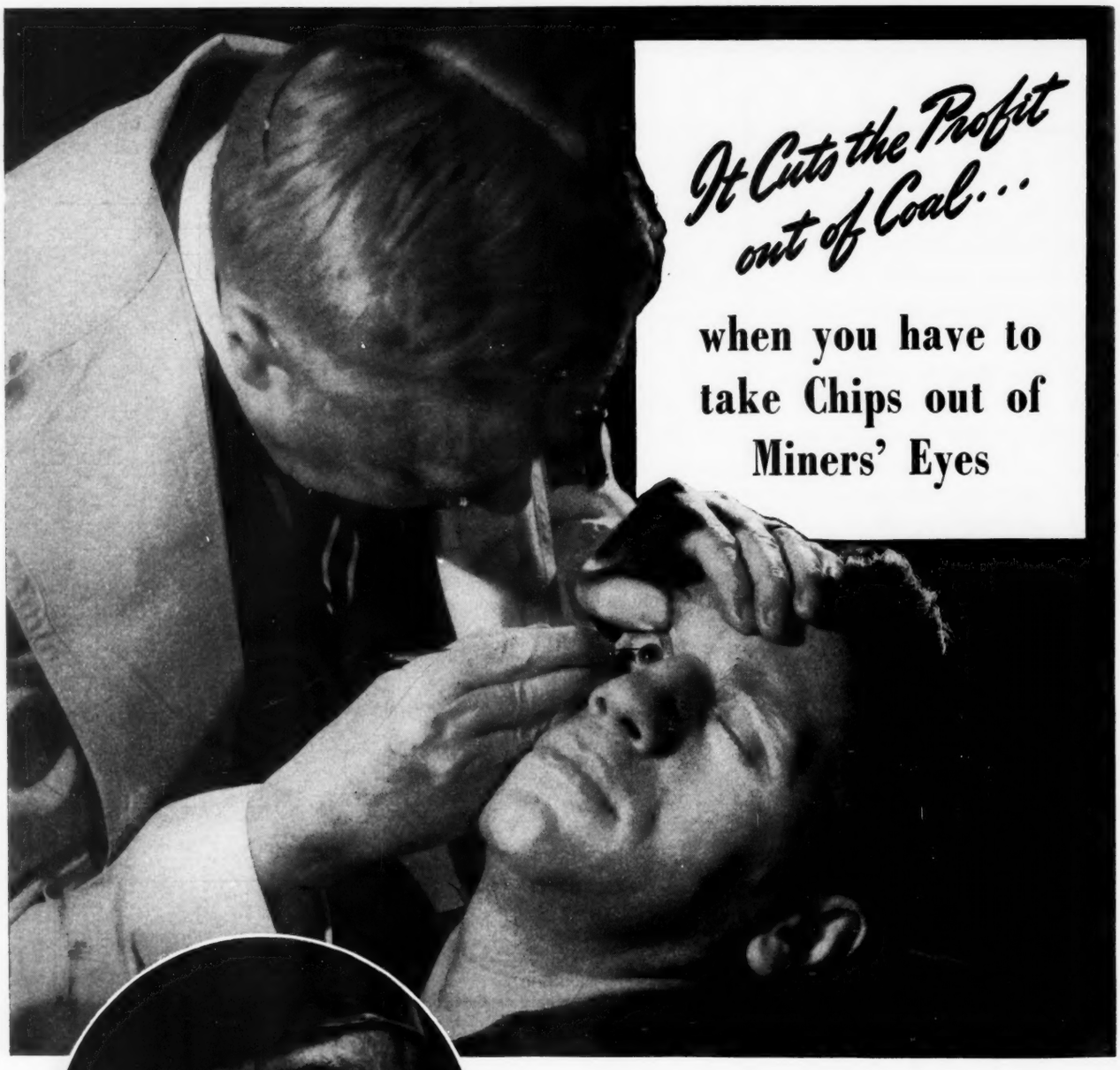

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CHALLENGE TO INDUSTRY'S PATRIOTISM

Calls for Plain Speaking

IT is a pity that the greatest national defense effort in American history had to be made during a presidential election campaign. For a modern defense effort involves an intensely practical industrial project, while an election campaign involves an intensely emotional political propaganda. And those two don't mix.

That, as I see it, is the chief reason for the welter of claims and denials, charges and counter-charges that have been getting in the way of contracts for planes, tanks, guns and all the rest of the armament for which the American people are so nervously peering down the road.

We are told that the managers of industry, smarting and suspicious under the repeated attacks of government officials for some years back, have been reluctant to assume the abnormal risks of defense contracts without commensurate safeguards, and that the politicians who must authorize those safeguards have been reluctant to do anything that might be construed as letting down the bars for unscrupulous business men to exploit the national emergency. For the one, the business risks of full speed ahead have been too great; for the other, the political risks of full speed ahead have been too great. So we don't go full speed ahead.

This is not written to increase that clamor of recrimination on either side. On the contrary, it is an appeal for some decent and thoughtful consideration on the part of all concerned—consideration for the urgent needs of the nation, for the problems and responsibilities of both the politicians and the industrialists, for the elementary principles of prudent business management, and for the good opinion of the man on the street. He is neither a politician nor an industrial executive. But his hide and his pocketbook are at stake in the national defense program—and he knows it. He has a right to the low-down on what is going on. And if he is left in ignorance or deliberately deceived, for the sake of either political or business whoopee, the payoff will be mighty poisonous political medicine for the politicians and equally poisonous business medicine for the business men who may be responsible.

* * *

The plain stark fact, to be faced squarely by us all, is that the national defense program is an emergency project—a desperately urgent emergency project.

As in every emergency that confronts a democracy, we are harassed by a confusion of counsel. As always, some of the confusion arises from honest but conflicting judgments, some of it from ignorance or muddy thinking. But, unhappily, much of it reflects the deliberate purpose of self-seekers to fish in troubled waters—to capitalize the conjunction of a national emergency and a political campaign to boost their own interests. Already the charge that American business men are unpatriotic and interested only in profit has been put out as a smokescreen to cover up deficiencies for which business men are in no way responsible.

Now the man on the street finds it hard to see through this maze of excited contradiction. Not because he isn't smart—the average American can think straight enough *when he has the facts.* But in this case the facts are obscure and complicated—they have to do with matters that are strange to him. And to make it worse, at the height of his confusion, raucous voices constantly assail his ear with "simple" explanations of it all. But, as so often happens, most of these "simple" explanations make the matter a lot simpler than it really is.

* * *

Consider, for example, the cry that "industry refuses to get busy on national defense until its profits are guaranteed". Very clear and simple, to be sure; but also very false. The charge that American capital is "on strike" in the hour of national need. As silly as it is simple. The assertion that our manufacturers "won't even talk with a government anxious to place orders with them, without large financial concessions", and that "American corporate industry refuses to expand its resources for defense until it receives immunity from proper taxation". The resounding demand that we "conscript wealth as well as men"—whatever that may mean.

Particularly political has been the attack on the aircraft industry. It has been made to appear that aircraft manufacturers were instituting a sit-down strike because, in their greed for profits, they demanded more than 8%. Actually the 8% was not a net profit at all and the only concern of the manufacturers was to fight against incurring losses under the 8% limitation. And army and navy officers have sustained the aircraft manufacturers' viewpoint.

The air is full of explanations which, however simple they may sound, do not explain. And in most cases, I am convinced, the purpose of those who offer them is not to explain but to inflame. Those who try honestly to explain these issues from either side, find it impossible to do the job in such ringing phrases.

As I have said, our country has been caught short. As

a result, there are many reasons for the confusion and controversy. The plain fact is that we can produce our war equipment by only two means: (1) by converting the industries of peace into the industries of war, so far as that is possible; and (2) by building from scratch the new facilities we need to supplement them. In other words, we must create—with desperate haste—a new industry in America—an armament industry.

Right there is the crux of the problem that now confronts the industrialist sincerely trying to equip himself for his part in national defense. For this new armament industry is not the ordinary business risk against which he has learned to weigh the interests of his employees and his stockholders. It does not deal with familiar products and processes. It is not continuous—at least it has not been heretofore in this country—and it may fold up as suddenly as it has opened. It cannot hope to serve thousands of potential customers: it has but one sure customer—the United States Government—and wielding the sovereign power that customer can do just about as it pleases with respect to its needs and demands. Which means that not even this one is a *sure* customer.

* * *

No more unfair or deceptive charge ever has been leveled against American industry and American business men than the accusation of being unwilling to take the normal business risks of the defense program. The risks they are trying to minimize—they cannot possibly avoid them all—are very special and extraordinary risks indeed. So clearly is that true, that I doubt very much whether such questions and charges ever would have risen were it not for the fact we are engaged in a political campaign.

Already some of industry's great units have gone ahead with the building of new facilities, the purchase of special materials, and the actual production of armament in the face of all risks, gambling that their government eventually would work out some reasonable plan to protect them against excessive loss. Others, doubtless will follow suit.

But many other companies, for one reason or another, are not in position to do that. So before they begin to expand their facilities to handle defense contracts, they have asked their *only potential customer for those new facilities* to guarantee them—*not* excessive prices, *not* exorbitant profits, *not* immunity from taxation, as we are being told, but simply against the excessive losses that may result from very extraordinary conditions.

* * *

As this is written, it looks as though the legislation and the rulings necessary to accomplish this purpose soon will be forthcoming. Thoughtful and responsible officials of the government understand the situation and what is needed. But, unfortunately, their understanding and action will not quiet the professional business-baiters. So long as those gentlemen have their own interests to serve, so long as political excitement makes it easy to whip up public demand for a scapegoat to atone for disappointing progress with the defense program—just so long will the business-baiters find a receptive audience for their criticisms.

All of which suggests that business men must carry at this time a double responsibility, in addition to their obvious obligation to do the very best job they know how on their individual parts of the defense program.

The first of these added responsibilities is, of course, to avoid any possible basis for the charge that industry is exploiting the defense program in behalf of excessive profit, unfair treatment of labor or any other unworthy self-interest. The second is to see that the man in the street knows and understands all that I have tried to set down in the foregoing.

For the man in the street is deeply involved in all this. He is "in the street" only to the political orators. To the rest of us, he is the man in the factory, the man on the truck, and the man behind the orders that industry fills. In short, he makes up this living American industry on whom the politician's charges spatter. As an employee he has a stake in the solvency, the security, and the reputation of the very plants at which criticism may be directed. Knowing the facts, he can answer the critics so far as his own plant is concerned and can see how the same kinds of facts apply to all industry. If he is a customer, suffering inconvenience as a result of the plant's service to national defense, a knowledge of the facts behind the plant's problems will help to make him a defender rather than a critic of responsible business management. If he is a neighbor in the community, the facts will equip him to be an interpreter of industry's problems to the people of the home town.

* * *

In this national defense effort, business enters into a new partnership with government, but, more importantly, into a deeper partnership with the American people. It is more than ever essential that it take all of the American people into its confidence, beginning with the people in its plants and going out through the ranks of its customers and its community neighbors to show them that they have a common interest in seeing that the task of national defense is undertaken in the American way.

As we all know, there are in this country some people who would like nothing better than to see American industry fail in this supreme test of service to the nation. They will watch with jealous eyes every move of every company that is engaged on a defense job. They will disparage its achievements, exaggerate its shortcomings, and distort its motives. For they would like to make over American industry to their own pattern, and they'll never have a better chance to get started with it than has been opened up by the national emergency. Or so it looks to them.

So, great as are the business hazards of the defense program for the individual business man, even greater hazards are involved for American industry as a whole. But, knowing the temper of American industrial leadership as I do, I am confident that it will handle its defense assignment with credit to itself and with great advantage to the nation that it serves—whether in war or in peace.

To help in that supreme test is the opportunity and the privilege of the McGraw-Hill organization.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

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DEVOTED TO THE OPERATING, TECHNICAL AND BUSINESS PROBLEMS OF THE COAL-MINING INDUSTRY

Coal Age

Established 1911 — McGraw-Hill Publishing Co., Inc.

SYDNEY A. HALE, Editor • SEPTEMBER 1940

Pertinent and Impertinent

• EXTENSION of the Guffey-Vinson act and sympathetic consideration to similar legislation for the anthracite industry are promised in the 1940 Democratic platform. Is this a bid to the rebellious Mr. Lewis to return to the New Deal fold and all will be forgiven—at least until after the election returns are in?

• IN THESE DAYS of scientific development of air conditioning for the surface dweller, why not take this further forward step in modernizing coal mines to safeguard the health and comfort of the underground worker as well? That there is no substitute for adequate ventilation is already well founded in miners' minds for life conservation. How easy to now contribute to his health and comfort with modern air-conditioning methods.

• WISECRACKING is a great American institution and a pleasant escape from many embarrassing questions. But some problems—alas!—defy such facile, bright-tongued solution. You can't wisecrack your way out of a $47,000,000,000 national deficit.

• BETTER REALIZATION through increased prices is the lure held out by the minimum-price schedules promulgated by the Bituminous Coal Division of the Interior Department. Such a leveling up, however, at best can offer only temporary relief. The fuel market is still highly competitive, and relatively few consumers are chained to coal. Increasing realizations through decreasing costs is the only safe road to permanent profitable coal production.

• WHERE MINE ROOF is as secure as the sky, mine haulage at speed can be made safer than surface railroading. There is neither frost to heave the track, storms to dislodge it, changes of temperature to make it buckle, fills to settle it nor height of equipment to cause instability. The only reasons for present low-speed travel in mines, therefore, are poor track, changes of gradient, bad roof, squeezes and lack of adequate signaling equipment. All these are remediable and are fast being remedied.

• RAPID MULTIPLICATION of regulatory commissions has pitched many fledglings into positions of great responsibility. Some of these tyros have cautiously felt their way along. Others, more impatient, give the impression that they think themselves male Minervas so armed with knowledge they cannot err. Position, however, is no patent to learning and brilliance unadorned is often a poor substitute for experience. Regulation is a school at which both regulators and regulated can acquire fresh knowledge. If these new-hatched Olympians would listen patiently to men grown gray or bald in industry, they might possibly save themselves from many ridiculous pronouncements.

• SAFETY is not assured in a gassy mine by use of permissible equipment—even with power tanks and storage-battery locomotives—if cutting-machine bits can become hot enough at any time to ignite methane. This gas, because of lack of ventilation in the kerf and of gas emission from newly cut coal, often is at high concentration. Water on the cutter bar would keep the bits cool, thus completing the safety cordon and preventing disaster.

• PROGRESSIVE MANAGEMENT accepts a production record in another mine of another district as a challenge to do as well or better under the limitations of its own operation. Dormant management, if aroused at all, expends its energy in explaining why such a record is unattainable in its organization. And some rude,

unfeeling persons have been known to characterize such explanations as alibis for inefficiency.

• WITH WAGE CONTRACTS scheduled to expire next April, would it be impertinent to inquire what the coal operators individually and as a group are doing now to give the coal miners a clearer picture of the economic position of the industry? And is the great silence enveloping the joint commission on mechanization to be interpreted as a sign of progress?

• NEW RECORDS are becoming a habit in the small-stoker field. Factory sales of domestic units the first half of 1940 showed an increase of 44.7 per cent over the first six months of last year and 62.3 per cent over the corresponding period in 1938. These continual increases may grow a bit monotonous, but it will be a welcome monotony. Let's have more of it.

• YOUNG MEN—and older ones, too—reaching out for better jobs can well ponder on two sententious remarks. The first, uttered by the head of a large and successful business organization, runs: "I always like to give promising men positions of greater responsibility to see whether they will really grow or merely swell up." The companion piece is the admonition of a nameless sage who said: "Be nice to the people you pass on the way up; you may meet them coming down."

• AVOIDING stream acidification is not so much a matter of "water purification" as keeping the mine water uncontaminated with acid. Some of the trouble could be avoided if mine management understood the correct technique. It would save money. But management cannot be blamed when it never has been told.

Explosive Dirt

COAL DUST in electrical controls causes many delays and is a hazard to life and property. Yet only a small percentage of the preparation plants are equipped with dustproof controls. At a recent installation, a coal-dust explosion in a switch blew the cover off with such violence that it could have caused a death. Given a combination involving an accumulation of dust on an adjacent beam or ledge and that type of ignition might blow up the entire structure.

Ordinary steel boxes used with starters and switches are far from dust-tight. Covers with closely spaced bolts or spring catches and resilient gaskets such as sponge rubber are needed. Many starters include small relay contacts and timing devices which should be protected from dust to insure satisfactory operation over long periods. Too frequently even the imperfect protection of the ordinary cover is destroyed by leaving it partly loose or hanging ajar after some connections have been adjusted or additional circuits installed.

The industry as a whole should adopt as standard practice the example set by the companies that have installed all controls in truly dust-tight inclosures. It is a safety measure which also will pay dividends in maintenance.

Be Prepared

BITUMINOUS coal production the first seven months of 1940 ran 31.5 per cent ahead of last year. Still more significant, however, is the fact that the cumulative output through the first week in August was 85.2 per cent of the total for the corresponding period in 1929. That year is remembered by industry at large as a golden one. Although the bituminous mines fared less handsomely on the financial side than many other enterprises, the output climbed to 535,000,000 tons—a figure exceeded only five times in earlier years and never reached since the start of the depression.

And yet, cheerful as the comparison with 1929 must be, it is no augur of the load which may be placed upon the mines the rest of the year or in 1941. For the most part, the tonnage so far produced has gone to meet normal industrial and domestic demands. The bulge which reasonably may be expected when the defense program really gets under way is still to appear. General business statistics for the first half of 1940, as Col. Leonard P. Ayres, vice-president, Cleveland Trust Co., points out, "reveal little evidence to indicate that we have been putting our maximum energies into a great national effort for rearmament."

Present production facilities, fortunately, are under no strain. Current weekly output, it is estimated, absorbs only about 70 per cent of existing capacity. But there always is the danger that transportation may prove a bottleneck as tonnage rises. That, of course, is something beyond the control of the industry. Conditions within are not. Machinery wears out or becomes obsolete, inefficient methods are a drag upon tonnage per man-shift. These are things the coal-mining industry can and should correct before they become barriers to increased production.

Deadly Bunk

CAN mine explosions and other disasters be stopped by legislative fiat? The *United Mine Workers' Journal* says so. A recent front-page summary of lives lost in major disasters of 1939–40, published in that labor organ, concludes with this unqualified declaration: "Congress can prevent such catastrophes by passing the Neely-Keller mine-inspection bill." A few more pages added to the federal statues and the human frailties which cause accidents will disappear. Just as simple as that.

A certain amount of bunk, of course, is to be expected in the heat of any campaign — legislative or political. But where human life and safety are at stake, hokum which lacks even an aura of plausibility cannot be lightly dismissed. Everybody familiar with mining operations knows that legislation is no panacea for accidents. The danger to the future safety of the mine worker is that such claims may impress those who do not know the facts.

INSPECTION SYSTEM

Of State Department of Mines Shows Discipline Determines Accident Rate

"Let's take a chance"—deliberately or unconsciously — daily piles up the industrial-accident toll. In West Virginia, however, the Department of Mines is closing in on chance takers with an inspection report listing 479 practices and chances considered unsafe. Every indulgence in such chances or practices noted by a State mine inspector means a red circle in the official inspection report of the mine. How this detailed checking is encouraging discipline and promoting greater safety is outlined broadly by Mr. Rhinehart in the present article.

By N. P. RHINEHART
Chief, Department of Mines
State of West Virginia

SINCE a new form of inspection report was introduced into the coal mines of West Virginia in January, 1938, there has been a marked improvement in accident reduction. The tons of coal mined per fatality have progressively increased from an average of 343,373 tons for the preceding five-year period (1933-37 inclusive) to 391,260 tons per fatality in 1938 and to 407,953 tons for 1939. The tons mined per non-fatality likewise showed a progressive increase from an average of 9,129 tons for the preceding five-year period to 10,166 tons in 1938 and to 11,766 tons for 1939. The accident record for past years and the trend are shown in Table I.

Safety for 540 Mines

Safety in the mines is of paramount importance in West Virginia. The growth of industry and the welfare of the State have been attributable in a great degree to the extensive development of the bituminous mining industry. Since 1931, West Virginia has led all other States in the production of bituminous coal. Bituminous coal is mined from about 540 mines; about 109,000 persons are regularly employed and coal is produced from 35 of the 55 counties. A peak of production was reached in 1927 when 146,088,121 tons was mined. This decreased to 86,114,506 tons at the depth of the depression in 1932 and increased again to 118,965,066 tons in 1937. Production in 1939 was 108,515,665 tons.

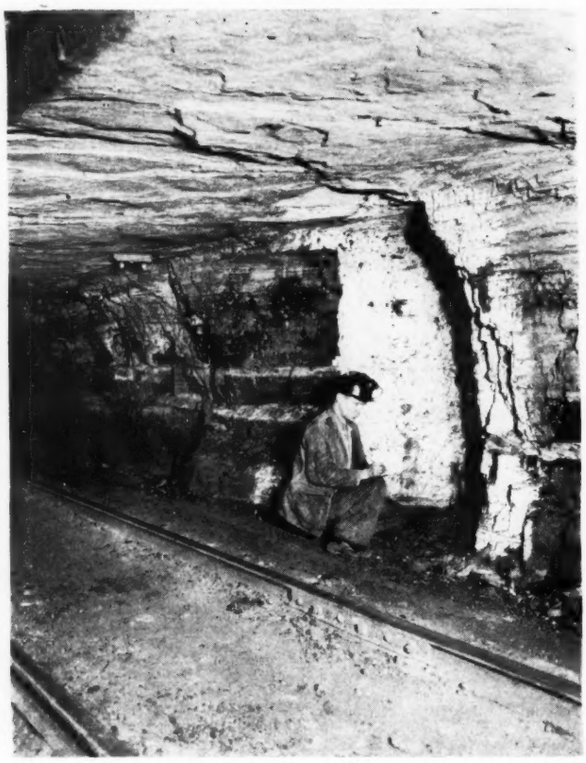
The vast coal deposits of West Virginia are found in a broad belt roughly covering the middle of the State between its northern and southern boundaries. The various coals are contained in about 100 separate seams of which 30 are of sufficient thickness to be mined. These coals are of exceptional quality and include many which are superior to any found in other coal-producing areas. They cover a wide range of characteristics and are adaptable for use under a great variety of special requirements. They range from the high-grade low-volatile coals mined in the southern portion of the State from the Pocahontas, Winding Gulf and New River fields, through the high-volatile gas and splint coals of the Williamson, Logan and Kanawha fields to the high-volatile gas coals of the Northern and Panhandle fields, among which is included the justly famous Pittsburgh coal.

The topography of the coal area is extremely rugged. The original Cumberland Plateau has been eroded into deep narrow valleys with steeply pitching hillsides. The coal seams are comparatively horizontal, with a slight general dip to the northwest and are exposed along the hillsides or at comparatively shallow depths below drainage. The deepest producing shafts are less than 700 ft. Seams mined range from about 2 to 9 ft. in thickness with a great variety of roof and bottom conditions. The seams mined below drainage usually are very gassy and include some which are classed as the most gassy in the nation.

In recent years there has been a decided increase in conveyor loading and mechanically loaded coal. In 1934, coal loaded by mechanical assistance amounted to only 1.25 per cent of total production. In 1939, conveyor and mechanically loaded coal amounted to about 29.00 per cent of production.

25 Inspection Districts

Since 1925, the State has been divided into 25 mine inspection districts with one mine inspector assigned to each district. In the meantime, mines have been developed and have become more extensive; one shift per day has been changed to double shifting and in many cases to triple shift-



Inspector Joe Mulligan puts a red circle in the book. A trip has just passed. The refuge hole was available, as provided for in the regulations, but — alas! — for some reason this trip was without a tail light.

ing. This transition in operating procedure has greatly increased the work required of each individual inspector and it is increasingly difficult to make inspections effective in the reduction of accidents.

The Department of Mines is responsible for the enforcement of measures designed to promote safety in the mines. Since its establishment many basic facts have been proved. The safety records of many progressive companies that have adopted and enforced standard codes for operation and safety have been outstanding. An exhaustive study was made of the various rules adopted by these companies, and those which were applicable to all mines were combined with existing mining laws to form a definite plan for safety. These rules form the new inspection report.

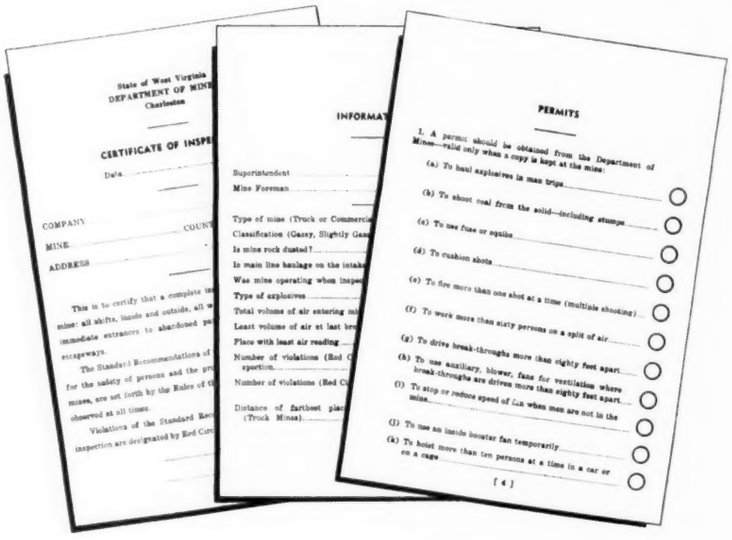
The great majority of accidents are attributable to definite recurring causes. Accidents can be reduced only by eliminating these basic causes. The fundamental approach to safety is known by all mining men. It remains only to establish the system by which our knowledge is put to effective use.

The inspection report outlines, in detail, rules designed to regulate conditions and practices recognized to be sources of danger. It provides for a uniformity of inspection which could not be obtained by any other system. It educates the individual inspector and teaches him to be more alert in detecting existing defects. It eliminates, to a large extent, the oversight of minor defects which contribute to the accident rate. It serves as a constant reminder to the officials and men at the mines of the policy of the Department of Mines. It resolves to simple rules the requirements of the department in the operation of the mine. It enables the management of each company to become conversant with the conditions and practices existing in their mines. It directs specific attention to every violation of safety practice.

Each individual mine is subjected to the same yardstick of inspection. When an inspection is made, each violation of the rules, or each defect in condition and practice, is designated by placing a red circle at the end of each rule violated. The number of red circles is an indication of the efforts toward safety made by the individual mine, and a direct comparison can be made with other mines.

The accident record of any mine depends upon the extent to which discipline has been established. The inspection report not only measures the success of such discipline but also serves as an educational means of acquiring discipline. The inspection report has now been in effect in West Virginia for over two years. Drastic reforms are not fully accomplished in such a short space of time. There is sufficient evidence, however, to indicate that this report will be an effective agent in the reduction of accidents.

That there is a decided relationship between the efforts of mines toward safety, as shown by red circles, can no longer be questioned. Inspections of all mines have been made more or less uniformly regardless of


State of West Virginia
DEPARTMENT OF MINES
Charleston

CERTIFICATE OF INSPE

Date

COMPANY
MINE
ADDRESS

INFORMA

Superintendent
Mine Foreman

Type of mine (Truck or Commercia
Classification (Gassy, Slightly Gas
Is mine rock dusted?
Is main line haulage on the intake
Was mine operating when inspec
Type of explosives
Total volume of air entering m
Least volume of air at last bre
Place with least air reading
Number of violations (Red C
spection
Number of violations (Red C
Distance of farthest pla
(Truck Mines)

PERMITS

1. A permit should be obtained from the Department of Mines—valid only when a copy is kept at the mine:

(a) To haul explosives in man trips
(b) To shoot coal from the solid—including stumps
(c) To use fuse or equiso
(d) To cushion shots
(e) To fire more than one shot at a time (multiple shooting)
(f) To work more than sixty persons on a split of air
(g) To drive break-throughs more than eighty feet apart
(h) To use auxiliary, blower, fans for ventilation where break-throughs are driven more than eighty feet apart
(i) To stop or reduce speed of fan when men are not in the mine
(j) To use an inside booster fan temporarily
(k) To hoist more than ten persons at a time in a car or on a cage

[4]

differences in natural conditions. To date, the average mine receives about 40 red circles. Naturally, those mines which have been operating under accepted codes for a long time have fewer red circles than those which had not established any standards for operation. The mines with the fewest red circles have a decidedly better safety record than those with more red circles, as shown by Table II, which has been calculated from the performance for the year 1939.

Fatalities in the first group listed in Table II show an approximate decrease of 95.0 per cent as compared with the second and a 171.0 per cent decrease as compared with the third group. The non-fatality record of the first group shows nearly 50.0 per cent decrease as compared with the second group and 106.0 per cent decrease as compared with the third group.

Table I—Tons Mined Per Fatality in West Virginia

	Falls of Roof and Coal	Cars and Motors	All Causes Excluding Explosions	Explosions	All Causes Including Explosions
1883–1892, 10 years	319,889	1,829,770	244,621	973,282	195,488
1893–1902, 10 years	275,881	1,141,842	197,389	2,192,336	181,085
1903–1912, 10 years	315,684	1,051,311	201,067	504,117	143,737
1913–1922, 10 years	419,865	902,393	238,868	2,035,373	213,779
1923–1932, 10 years	511,313	1,133,218	293,600	2,464,972	262,351
1933–1937, 5 years	603,054	1,357,645	357,034	8,974,270	343,373
1938	667,936	1,669,841	410,136	8,501,009	391,260
1939	627,258	2,047,465	417,367	18,085,944	407,953

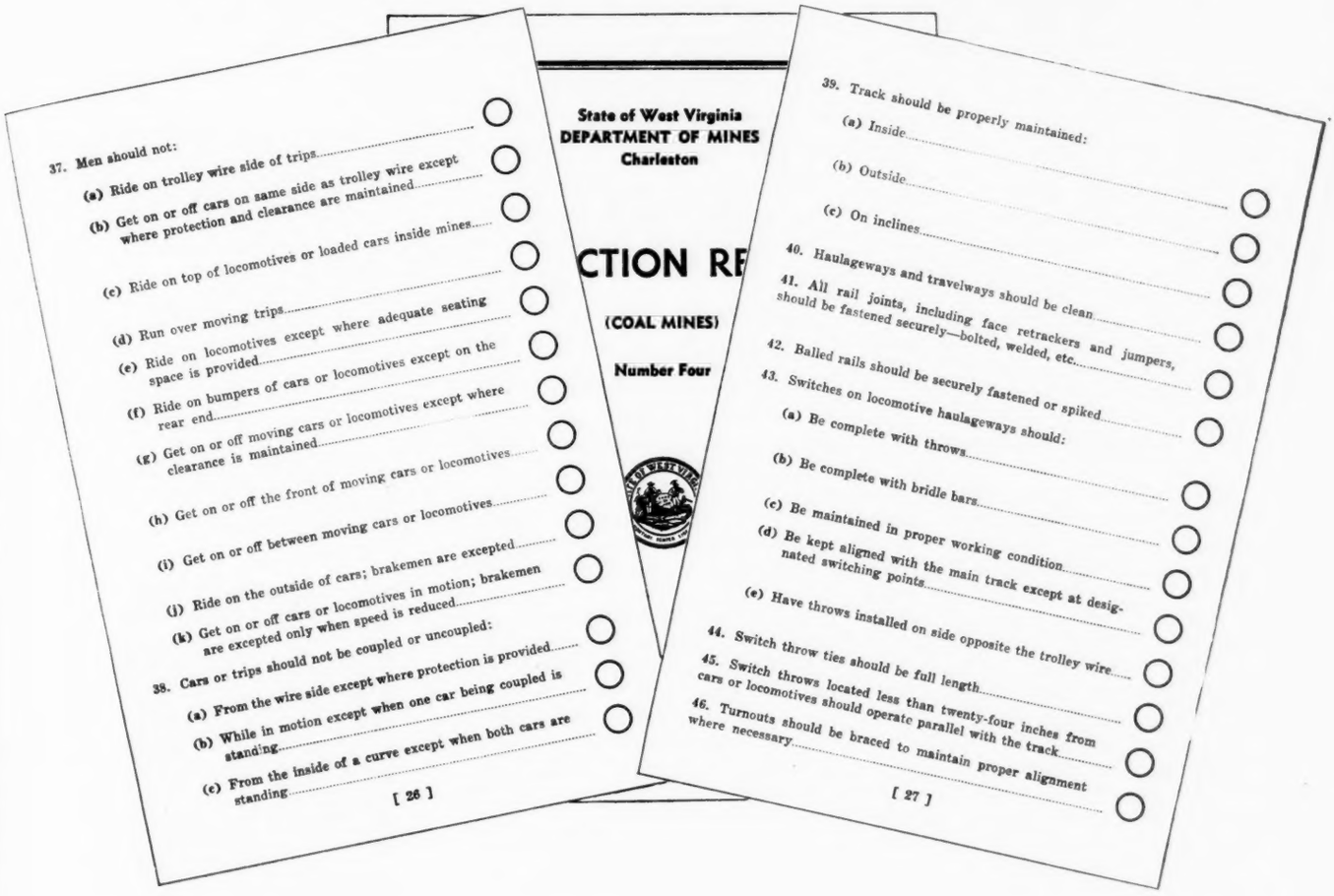
It is apparent that this is the way to safety. The records of the mines with the fewest red circles are not the mere result of chance. It is difficult to determine to what extent safety can be made effective. It is certain that we have a long distance to travel to achieve that degree of safety which the mines with the fewest red circles have demonstrated to be possible.

The success of any program for safety depends upon the cooperation of the mine management and the employees. In West Virginia this cooperation has been sincere and wholehearted and there is abundant promise that the records of the succeeding years will show greater improvements.

Table II

	Tons Per Fatality	Tons Per Non-Fatality
Mines with 1–10 red circles	897,305	19,296
Mines with 11–40 red circles	459,167	12,873
Mines with more than 40 red circles	331,002	9,345

"Do's" and "don'ts" for men and equipment literally pack practical safety experience into each page of this pocket-size inspection book


State of West Virginia
DEPARTMENT OF MINES
Charleston
CTION RE
(COAL MINES)
Number Four
37. Men should not:
(a) Ride on trolley wire side of trips
(b) Get on or off cars on same side as trolley wire except where protection and clearance are maintained
(c) Ride on top of locomotives or loaded cars inside mines
(d) Run over moving trips
(e) Ride on locomotives except where adequate seating space is provided
(f) Ride on bumpers of cars or locomotives except on the rear end
(g) Get on or off moving cars or locomotives except where clearance is maintained
(h) Get on or off the front of moving cars or locomotives
(i) Get on or off between moving cars or locomotives
(j) Ride on the outside of cars; brakemen are excepted
(k) Get on or off cars or locomotives in motion; brakemen are excepted only when speed is reduced
38. Cars or trips should not be coupled or uncoupled:
(a) From the wire side except where protection is provided
(b) While in motion except when one car being coupled is standing
(c) From the inside of a curve except when both cars are standing
[26]
39. Track should be properly maintained:
(a) Inside
(b) Outside
(c) On inclines
40. Haulageways and travelways should be clean
41. All rail joints, including face retrackers and jumpers, should be fastened securely—bolted, welded, etc.
42. Balled rails should be securely fastened or spiked
43. Switches on locomotive haulageways should:
(a) Be complete with throws
(b) Be complete with bridle bars
(c) Be maintained in proper working condition
(d) Be kept aligned with the main track except at designated switching points
(e) Have throws installed on side opposite the trolley wire
44. Switch throw ties should be full length
45. Switch throws located less than twenty-four inches from cars or locomotives should operate parallel with the track
46. Turnouts should be braced to maintain proper alignment where necessary
[27]

HOW MANAGEMENT

And Its Policies Look to the Men Who Must Actually Mine and Load the Coal

What does the mine worker think of the policies management lays down? How does he react to its drives for increased efficiency and fewer accidents? What does the miner demand from his immediate superiors? If he doesn't get it, what happens? And what would he do to better operating performance if management's job were his? These, Mr. Boss, are some of the questions which the author, a loading-machine operator, answers in presenting the viewpoint of the mine workers.

By GAULT M. HELLEIN
Uniontown, Pa.

MY JOB is operating a loading machine. On my off days, I have visited other mines and observed other operators in action. Without posing as an expert, I can pass on a few suggestions that may increase efficiency, safety and lower costs. First and foremost, you need a good section boss. Handling men is an art in itself. Possession of State papers indicating So-and-So is a qualified boss does not necessarily mean So-and-So can handle men.

I have watched men in charge of mechanical sections, have worked under them and now I know why we have a powerful labor union. Such bosses have enrolled more members in the union than the smoothest agitator. Under proper leadership, a mechanical section strives to get every ton of coal it can. Under other leadership, it considers itself mere day men in there to put in seven hours.

Discipline for Safety

You want safety—some of you. But mostly you just talk about it. There is only one way to get it—discipline. It's useless to talk safety in one breath and then raise hell with the assistant foreman in the next room for not producing enough coal. Someone has said we can get what we want if we want it hard enough. You get what you want—production. Safety in mechanical mining calls for first-aid training—compulsory, if necessary.

Some local unions will object. Mine management should take the question up with the local; if compulsory training is not sanctioned, the refusal should be put in writing as a matter of record. William Hynes, president of District 4, stated in a recent court case that "we are for anything that is for safety." If this is true, local unions will sanction compulsory first-aid training.

You may say "my employees were trained 100 per cent last year." This may be true, but men forget proper methods of treating injuries. Take your first-aid men, some equipment, go to the face, stop the crew. Make one man the patient, explain his injuries or symptoms and observe the treatment. Their blunders and inefficiency may cause them to resume first-aid training voluntarily.

All members of the crew should be able to test for gas and bad roof, and know what to do when they find either. More important—they should do it! In visiting three mines and observing 26 cuts cleaned up, I saw roof tested once by a member of the crew. Foremen made their usual tests, but were not in every cut at the same time the crews were. With other places to visit, naturally the foremen couldn't spend all their time with the loader.

Use of machines requires fewer men, thereby lowering the total number of injuries, but more men can be hurt or killed at one time because of concentration and wider places. Minimum requirements for every crew member should include hard hats, goggles, safety toes, rubber footwear, rubber gloves and, perhaps, respirators.

Loading machines throw small pieces of coal some distance, so it may be advisable to wear goggles at all times. The essential thing is to get a pair that fits well and, therefore, is less annoying. By using goggles an hour or so each day in the beginning, operator, scraper and snapper can become accustomed to them. Anyone hanging cable on hooks, examining cable or taping it when power is on, should use goggles. A cable explosion may occur at any time and cause loss of eyesight.

Rubber footwear and, perhaps, rubber gloves are necessary for machine men, as track-mounted loaders may become grounded, especially on sand, and severe shocks may be felt. Respirators for dust, if no sprinkling system is used, may be a real benefit to health. Employers should think of these matters now because retroactive laws covering occupational diseases may be passed. Increased safety and efficiency are assured when the men are properly equipped, properly dressed and in good health. Clothing should be so adjusted there is no danger of it catching in machines.

Mechanical equipment may catch fire and become a deadly menace in a few minutes. Grease ignited by an exploding cable easily can destroy thousands of dollars in equipment and cause great suffering. Bags of rock dust in near-by breakthroughs would be a great help. One or two bags could be carried on the gathering motor to be near the machines at all times. A small first-aid kit also should be attached to the machine or motor.

Needless to say, there should be separate car checks for each crew, but in some mines this practice doesn't prevail. This is grossly unfair! Usually

the shifts race to get more coal and more wagons. One shift strives for tonnage and must compete with the shift trying to load the most cars. With separate check numbers, direct responsibility can be placed for loading slack cars, dirty coal and other evil practices. Each shift is entitled to recognition for what it does. In development work, the check number could be painted on the rib of each cut, thereby showing what crew sighted and cut the place and cleaned it up. Cutting crews could not pass the buck.

Another good idea is rotating the shifts, giving each crew a chance to work day shift, second shift and late shift. In some mines, the day shift gets the "gravy"; the second, the "leavings," and the third shift gets "hell." By rotating the shifts, the boys can run the scale.

While tramming, no one but the operator should ride on the machine. Most "mechanical" accidents occur while traveling. Day men should be forbidden to pass a machine while it is in motion. "Familiarity breeds contempt" and this is certainly true of tracklayers, shotfirers and others who work on a mechanical section. Controls on some machines are on the "off" position when they are up. A falling piece of coal, slate or timber could easily start them and, perhaps, injure someone. In many cases a slight adjustment will make the "off" position down.

Cable Care Important

Cable is important. Where excessive dust is present, a bad splice may burn through and cause serious damage. A good cable should be kept on the machines at all times; when a splice is necessary, a rebuilt or new cable kept near can be put on almost as quickly as a splice can be made. Cable usually is hung on hooks over roadways: it might be a good idea to have hooks all along the rib to keep cable off the bottom, free from water and the danger of cars jumping the track and cutting it.

Safety lamps hung on hooks opposite nips attached to the feed wire should be hung low, for the flame may rise, overheat the gauze and ignite gas if present. The fact that we test for gas and don't find it doesn't necessarily imply that it won't be there an hour later. Another evil is the bright spotlight worn by the motorman. All it does is blind his snapper and, possibly, the scraper. The motorman has no need for such a light.

A water spray can be arranged for a track-mounted loader. A coil of hose on the rear conveyor, on a hook or reel on the wide side, could be attached to pipes and flexible tubing or hose running along the side of the machine to a point back of the headlights, where a spray could be arranged. A valve on the machine also would be necessary.

Water pipes on the tight side are impracticable for loading machines, but this drawback can be overcome. Remove the valve and trench a piece of pipe under the track to the wide rib side. Trench in the rib for valve. Block road well so pipe will not be broken. As place advances, the pipe also can be advanced. This will provide water for cutter, shotfirer and loader without obstructing the wide side.

There should be a definite crew or person responsible for lubrication.

Expecting all crews to lubricate is possible, but getting it done is another matter. The crews want coal, the section foreman wants coal—"let's get it, boys, and let the next shift do the greasing." This haphazard system is costly.

I believe the mine foreman should study the conditions and set a definite tonnage quota. "Get so much coal, get it with safety and take care of your machines" would be a good, paying policy. In some mines, crews work straight through the lunch period—with pay. Where, as in development work, the heat is intense in some places, such a plan does not pay. A half-hour rest is a real stimulant and ofttimes the crew will produce more than if it worked straight through.

Here's an idea for manufacturers. I've watched several of their demonstrators at work. One is adept at tramming, another at loading, another at splicing cable. A pamphlet from the manufacturers explaining some of the tricks of the trade would help green operators learn quicker and produce more coal.

One of these days some bright-eyed youngster fresh from college will invent a system for mining from the outside by remote control. When that happens, I'll be pounding the streets wishing for the good old days.

SLIPING WITH PICKHAMMERS

Entering Mine by Level Rock Tunnel

Michel Colliery Simplifies Its Many Problems

In a field with 23 coal seams and over 200 ft. of workable coal, an approach to eight of those beds is gained by an almost level rock tunnel. The high-grade coking coal is mined on long faces by pickhammers and transported by shaking conveyors, belts and compressed-air locomotives. All coal now won comes from four of the upper seams; none is now being mined below the tunnel level.

By H. A. WHITE
Engineer, Crow's Nest Pass Coal Co. Fernie, B. C.

And R. DAWSON HALL
Engineering Editor, Coal Age

BY A LONG, almost level, cross-measure haulage road entering the mountain near the flood level of Michel Creek and driven for 4,600 ft. in the solid rock, the Crow's Nest Pass Coal Co., of Fernie, B. C., obtains access to eight or more workable coal seams, entering some of them twice, for the coal measures, which near Michel Creek are dipping steadily *away* from that stream at an average inclination of 13 deg., long before reaching the axis of the mountain have passed a basin and hence reversed their former inclination and are dipping even more steeply (with an average inclination of 35 deg.) *toward* that creek.

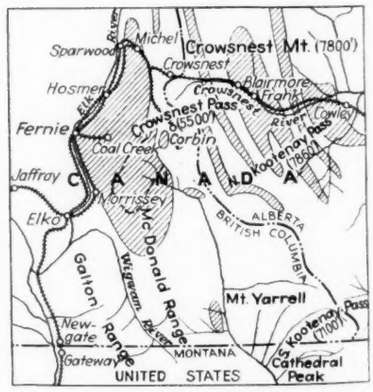
Slabbing 250-Ft. Faces

The system of mining now in operation at Michel Colliery consists essentially in creating, by appropriate development, a series of small panels, 100 ft. wide and 250 ft. long, undercutting these by air-driven machines in a succession of 5½-ft. slabs along their longer sides. Following each undercutting, the side of the small panel is scalped, scalloped or "sliped" back to the depth of the undercut with compressed-air picks, and the coal is loaded into shaking chutes by hand shovels wherever it will not run by gravity. Thereafter, it is handled successively by shaking chutes, belt conveyors and mine cars of 1.6 tons capacity, the latter hauled by air locomotives. That, in short, is the system, but in the *B* and 3 seams the long faces are shot—not sliped—and scrapers have been used in Seam No. 3.

This method of mining has proved safe and economical, assures the permanence of the main approaches to the several seams, economizes in mine timber, as the rock tunnels need very little timbering, eliminates much fire risk (an important matter in an arid country) and avoids many difficulties always inherent in mining where there are folded and faulted beds and where the coal areas are divided by a basin which makes it difficult for the trans-basin area to gain an outlet to the tipple.

Michel—town, mine, tipple, cleaning plant and coke ovens—lies in the valley of Michel Creek, which near the mine opening runs northeast along a line of faulting and folding in the strata, the small folds appearing to be the result of a fault; the coal measures to the east dip toward the creek and those to the west for some distance dip away from it. Mine No. 8 was opened on the east side of the creek and after operating for several years was closed so that work could be concentrated in the seams across the valley. All the present work near Michel is on the southwestern side of the creek in an important basin that may be canoe- or spoon-shaped at both ends, but only one end, that to the north, has been developed and delimited, and that end spoons out in the usual manner.

Workings driven in the hill show that the coal on the west side of the creek dips first of all at about 13 deg. and then rises at 20 deg., gradually increasing its inclination to 35 deg. and sometimes in spots reaching an inclination of 60 deg. (see cross-section in Fig. 1). Mines Nos. 1, 2, 3, *A* and *B* in the western mountain have a portal in common, being



Coal mining region around Crowsnest Pass.

reached by a rock tunnel which starts just above the floor of the valley and travels gently upward at a gradient of 0.6 per cent, reaching successively Seam No. 5 (which is 9 ft. thick), Seam No. 4 (8 ft.), Lower Seam No. 3 (7 ft.), Upper Seam No. 3 (4 to 12 ft.), Seam No. 2 (7 ft.), Seam No.

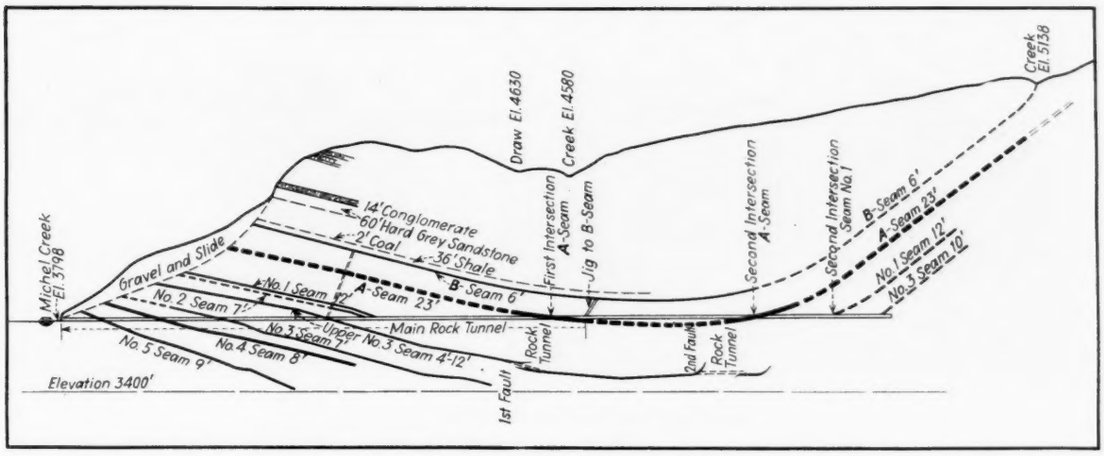


Fig. 1—Cross-section of westerly hill at Michel Colliery showing relation to main rock tunnel of Kootenay seams operated, as viewed from north of hill. Basin pitches rapidly to south.

1 (12 ft.) and Seam *A* (23 ft.). Above this is Seam *B* (6 ft.), which the tunnel does not actually reach because at the location of that roadway the basin of Seam *B* is not deep enough to do so, but to the south, or left, the basin rapidly gets deeper, so that a level rock tunnel driven to the left intersects the seam and serves as a connection. This seam has been more extensively mined than any other because it is the highest of them all in stratigraphical order, and hence its removal does not jeopardize the later extraction of the lower beds.

After passing under Seam *B*, the axis of the basin is crossed and also a series of faults, but the tunnel, being in rock, is unaffected and continues on its way serenely and reaches Seam *A* again, because that seam changes its former declination and pitches upward. Further in, No. 1 seam is again intersected. The tunnel also cuts another seam—whether No. 2 or Upper No. 3 is not clear. Perhaps No. 2 is absent, and it is Upper Seam No. 3 that is cut.

Tunnel About Mile Long

From the main portal, the total distance this rock tunnel has been extended through the years is 4,600 ft. (0.87 mile); yet in the line of the tunnel the seams are still outcropping on the Michel flank of the mountain and not on the Sparwood, or Elk River, side to the west. Further south, however, because of the increasing depth of the basin in that direction, they do not outcrop until they have passed the axis of the mountain and have reached the Sparwood flank. This is true already of two inclines in the *B* seam and more will so outcrop later. In all, there are 23 seams, 18 of which are 3 ft. or more in thickness. These latter average 11 ft. 4 in. and aggregate 203 ft. 6 in., but only those just recorded, totaling 76 to 84 ft., are being operated on the western side of Michel Creek.

Another rock tunnel, which serves for drainage of all the mines now operating on that western mountain, also as a return airway for some of the air from the mines and as an escapeway, has been driven from the surface, and at the first intersection of the main haulage tunnel with Upper Seam No. 3 approaches that tunnel and runs thereafter parallel to it at 100-ft. centers. These two tunnels are timbered only where they cross the coal seams and are 11 to 12 ft. in width and 8 ft. in height.

Seams Nos. 5 and 4 and Lower No. 3, to list them in the order in which they were reached by progressive extensions of the main tunnels, once were extensively worked, but, dipping about 13 deg., they soon plunged below water level and required heavy pumping. Because of this, and because they were under deep cover and their extraction would have an adverse effect on beds higher in the strata, they were and continue to be temporarily abandoned.

Entries in Upper Seam No. 3 (see Fig. 2) have been extended north to the north, or high, end of the basin, where they have been carried round

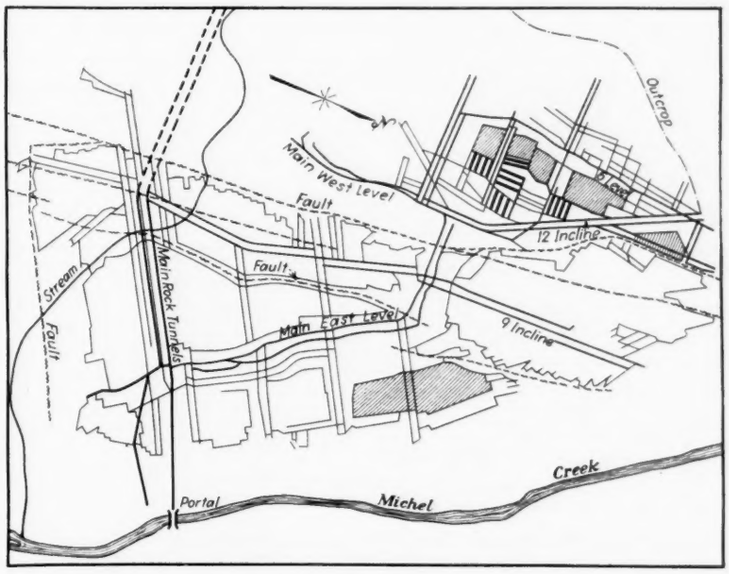
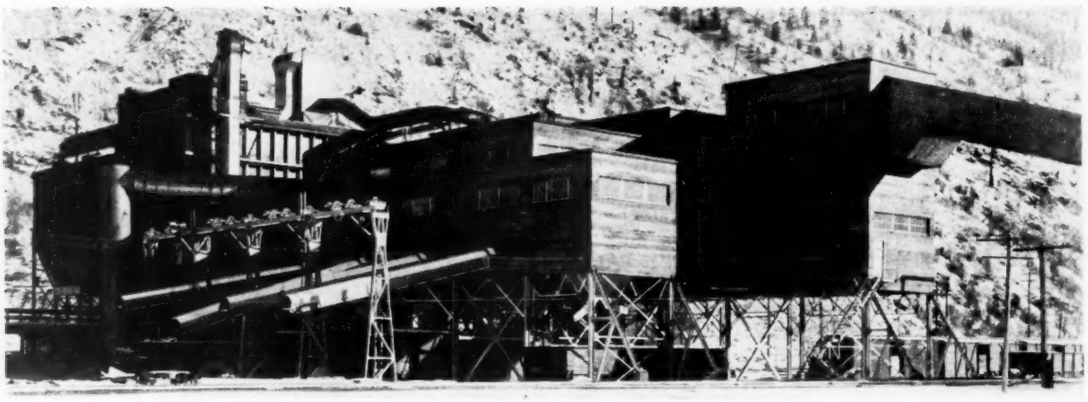


Fig. 2—No. 3 mine in Upper Seam No. 3. Stratigraphically, lowest seam in operation. Workings near the basin are cut off by faults bearing north along bottom of basin and those on south by faults bearing west, but main level manages to round spoon end of basin and open territory on opposing side. To date it is questionable whether the two twin rock tunnels intersect this seam or No. 2. All roadways marked by single lines.



Close-up of preparation plant at Michel Colliery.

the spooning end. All the coal has been mined to the outcrop both east and west of the basin almost as far as the north side of the main tunnel, mostly by rooms and pillars. Much of the coal on the east, or Michel, side of the basin and to the south of the main tunnels has been removed by these workings or by those of a large long-abandoned mine, No. 3 East, which operated still further south.

Coal on both sides of the basin will be taken to the main haulage tunnel, a distance from the south of four miles, thus reclaiming areas that former workings failed to reach. Through this tunnel also will be cleaned up what still remains to the north of it in Seam No. 3. In all, the coal available in this seam on the property of the company and above gravity drainage is perhaps 18,000,000 tons.

Seam No. 2 has not been operated, but Seam No. 1, the next intersected (see Fig. 3), has been extensively extracted both north and south of the main tunnels, but almost entirely on the east side of the basin toward the Michel outcrop. When a curved roadway was driven some distance around the spooning end of the basin, it encountered the faults already described, but, because of the intersection of the main tunnels with the seam on the other side of the basin, it will be possible to mine the coal on that side both to the north and south—a total above gravity drainage of perhaps 33,000,000 tons, for it also has a probable extension of four miles toward the south.

Coal in the thick *A* seam has been little developed in this area. It is to be left in place until the coal in *B* seam, above it, has been removed. In fact, the management fully realizes that, for conservation, the upper seams always should be mined first. Change in the direction of the main tunnels and their approach vertically toward the bottom of the several basins as the uppermost seams are reached bring the tunnels nearer the end of one basin than they were near the basin below it. Hence, the level driven to the north at the first intersection with Seam *A* begins to curve shortly after leaving the tunnel. It will be followed "around the Horn" until it connects with that point in the *A* seam where it is intersected a second time by the rock tunnel.

One entry pitching upward toward the outcrop facing Michel Creek—a two-heading working—has been driven from the northern development of the first intersection of Seam *A*. There was room for only one. Heading faces are being advanced with shaking conveyors which deliver the coal to a belt which in turn places the coal in mine cars on the level.

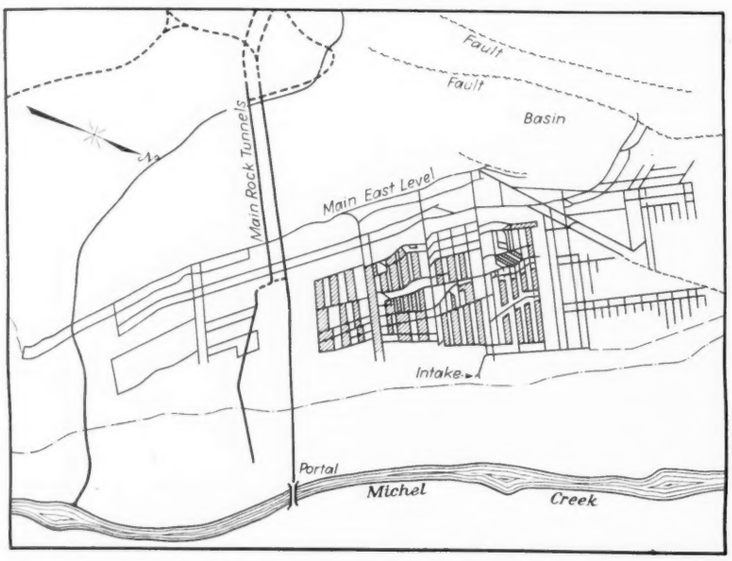


Fig. 3—No. 1 mine in Seam No. 1. Stratigraphically, lowest seam but one in operation. Curved heading to right shows where basin begins to spoon out, but the outcrop of the seam is located half a mile further.

Balance Road to Seam Above

As stated, the tunnels passed clear under Seam *B*, and to reach it a "jig," "balance road" or "gravity plane" (see Fig. 4) was driven at first through the rock at an inclination of 12 deg. 42 min. to the horizontal. Seven loads descending this incline haul up seven empties. Two levels have been driven around the curved end of the basin, the contour of which, at the level of the seam where the jig approaches it, is curved even over the main tunnels; hence, an excellent approach is provided to both sides of the basin.

A four-heading entry was driven almost due north up the natural tilt of the bottom of the basin which rises in that direction and from it double-heading inclined entries were driven northeast toward the Michel outcrop and west-southwest toward the Sparwood outcrop. Whatever direction these latter entries might be driven, to the right or to the left, they would have to travel steeply uphill, for in

any event they would start from the bottom of the basin and could travel only out of it and so uphill, for, as explained, the axis of the basin intersects the head of the gravity plane and the main entry follows up the bottom of the basin.

It is in this *B* seam that most of the development on the west side of Michel Creek has been made. Recently, a new rock tunnel directed to the southeast and driven left has been constructed from the main haulage tunnel, taking advantage of the fact that, as the basin dips in that direction, the seam, in a short distance, will have dipped as low as the tunnels. This new offset tunnel breaks into what is at that point the bottom of the basin in that seam, but, as the basin continues to pitch south for some miles, there are, of course, parts of the basin immensely lower.

Basin Widens to South

Two level entries have been driven from the end of this new tunnel, one around to the east side of the basin and the other around to the west side. The west entry eventually will travel nearly south. These entries will each consist of two headings with crosscuts and will diverge from one another, while between them will be an area from which coal eventually will have to be hoisted and water pumped, as that part of the seam will be lower than these levels and lower than the main tunnels. These level entries will extend about four miles, serving for both haulage and ventilation, and will have an average of 3,000 ft. of coal to the rise. The balanced plane, or jig, will serve henceforth as an auxiliary return airway.

Returning to the workings driven from the jig, the double-heading entries described as going to the rise and running, half of them northeast and half almost due west, have driven from them other double-heading subsidiary entries to the northwest or north. These, for lack of a better name, might be termed "subs." Between the two headings a 30-ft. pillar is provided and between adjacent subs is left temporarily a 250-ft. pillar (see Fig. 5).

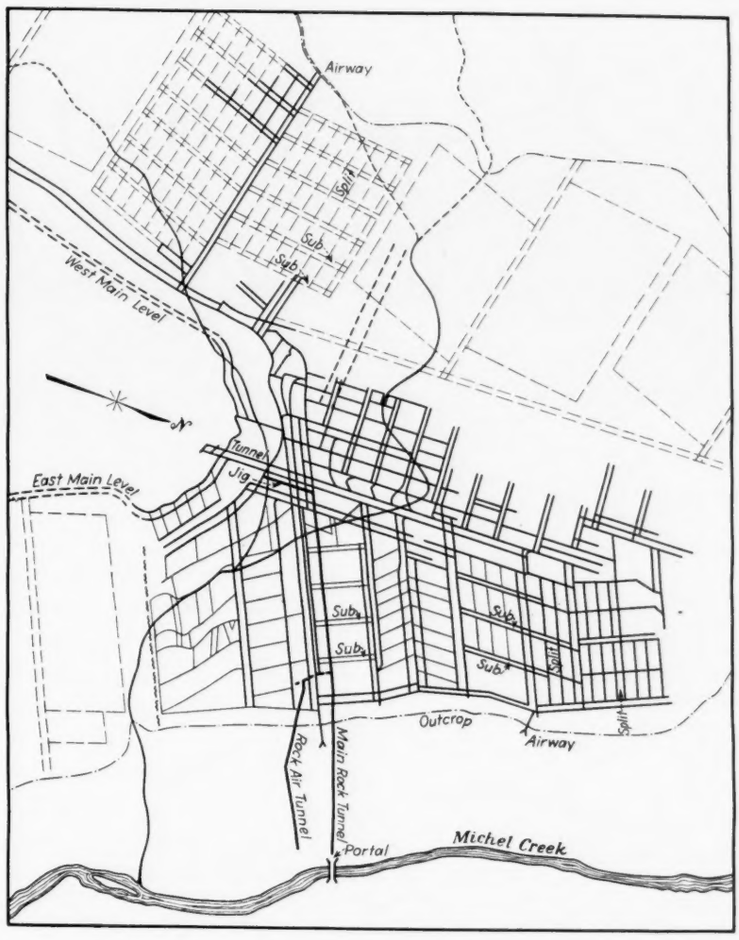


Fig. 4—*B* mine in topmost working seam. Illustrates how coal is extracted by driving subs and splits at right angles to make 100x250-ft. pillars which are mined in 5½x100-ft. slabs, driving up pitch toward caved area, but leaving 15-ft. fender below cave. Pillar coal removed with pickhammers and hand-loaded into conveyors. Coal as a whole is mined retreating but each separate pillar is worked advancing.

About at right angles to these with 100 ft. of clear space between them are driven either single rooms or room pairs with 20-ft. pillars between each pair of rooms. All rooms are 10 ft. wide; all these workings, whether rooms or room pairs, are known locally as "splits" because they split the pillar lying between adjacent subs.

The splits are provided with shaking conveyors, and the coal dislodged by mining is brought out by them. The rib of each split is first undercut for its entire length with longwall cutters (Anderson, Boyes & Co., Ltd., and Mavor & Coulson, Ltd.) for a

Operation at Michel, B. C., showing preparation plant and the new Curran-Knowles byproduct coke ovens in left foreground.

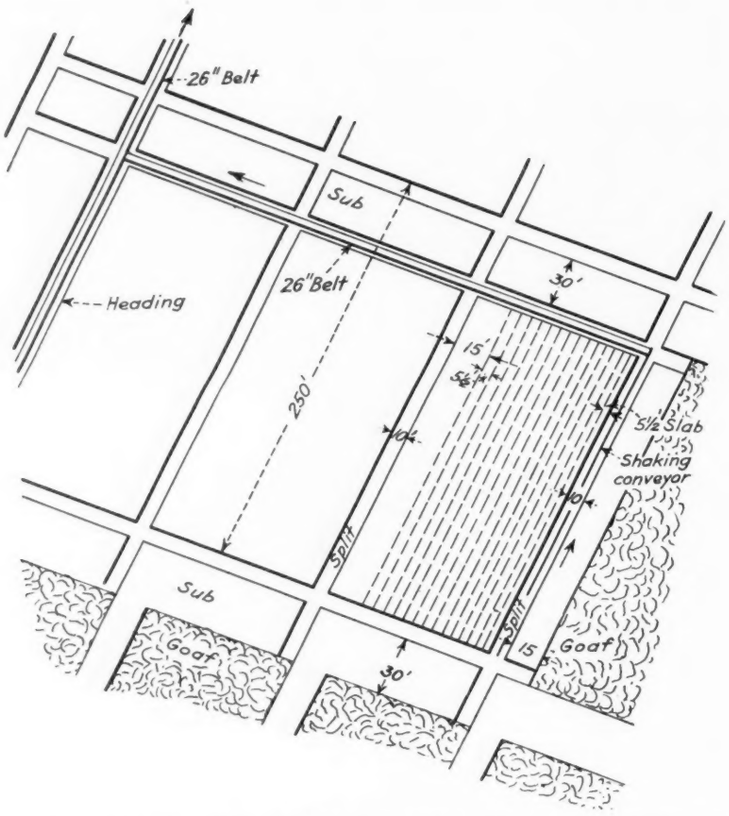


Fig. 5—Method of working at the face in Michel mine so as to simplify the operations of cutting and loading and to provide that every panel can be closed off when and if occasion may require. Meantime, the approaches to each working face are kept in coal pierced only by headings and crosscuts.

depth of 5½ ft. Both FAM9-2-A and Flottman air picks are used. When the coal is hard, shots are fired to break the face of the rib.

Every night, the shaking conveyor is moved toward the rib of the split. This procedure is repeated until the entire 100x250-ft. block is removed, except for a 15-ft. fender at the side of the next split, if the split is a room, or for a similar 15-ft. fender left against the far member of a split pair where pairs of rooms are used as splits instead of single rooms. Six-to-eight-inch diameter timber is set behind the conveyor.

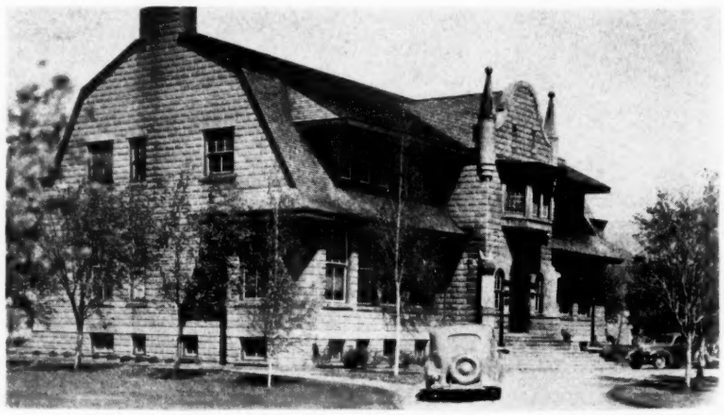
Coal from the splits is discharged into shaking conveyors or 26-in. belt conveyors located in the subs. In all future installations belts will be used. Thereby, the coal is brought to a 26-in. belt conveyor on the inclined heading from which the subs were driven. At the foot of this incline, the coal is loaded into 1.5-ton mine cars and hauled by air locomotives to the tipple. In one case, a belt has been placed in a sub instead of a shaking conveyor, and in actual practice, some modifications of the system have been arranged. Similar methods have been used in all the workings but with some variations; thus belts with scrapers were used in a district now worked out. In *A* seam, a belt and shaker conveyors have been used and additional units will be installed as development progresses.

All the side entries are now being driven to the outcrop before any attempt is made to get coal, and the panels are worked on the retreat, though each separate split is worked on the advance. In this way, squeezes do not cut off live workings, first breaks are made where they are most easily obtained, fires can be cut off, should they occur, and in case of emergency any portion of the panels easily can be isolated, leaving the mine still operable with safety.

In the *B* seam, a few entries, in being driven almost to the surface, have passed the crest of the mountain, and in one instance a drift has been constructed to the surface for the admission of air. Another entry, driven in the opposite direction, reaches the surface on the outcrop on the Michel side of the basin. Here, a suction fan has been installed, which causes the air entering at the aforesaid drift to ventilate the entire workings in the *B* seam.

Rock is shot by 40-per-cent dynamite. Deepest cover to date is 2,100 ft., but much deeper coal eventually must be mined, as the basin dips to the south and the bottom of the basin shifts toward the axis of the mountain. All the seams are in the Kootenay formation, which is of Lower Cretaceous age. From the *B* seam a daily production of 800 tons is obtained; from Seams A and 1, 1,200 tons, and from Seam 3, 400 tons, but increased production readily can be obtained from any seam.

Of the Crow's Nest Pass Coal Co., H. P. Wilson is president and general manager. At Michel Colliery, B. Caufield is superintendent; W. Chapman is his assistant; A. Cox, master mechanic, and J. Commons, chief electrician. This company also operates the Coal Creek Colliery, of which W. Whittaker is superintendent, and H. Johnstone, chief electrician.



Office of the Crow's Nest Pass Coal Co., in the central square at Fernie, B. C. Spacious grounds, planted with mountain ash, surround the office.

SCOOTERS IN THIN COAL

Produce 9 Tons Per Man-Shift

At Gauley Mountain Mine, in West Virginia

Further evidence that scooters offer another practical method of recovering thin seams with firm bottom is found in the work with a push-unloading type of box and special dump at Gauley Mountain Coal Co., Ansted, W. Va. Although still considered as experimental, the units during some months have enabled the crews to mine and haul to the sidetrack over 9 tons per man-shift in 30- to 34-in. coal. When used with mine cars not over 23 in. high above the rail, no extra roof height need be provided at the dump if seam thickness exceeds 50 in.

By J. H. EDWARDS
Associate Editor, Coal Age

IN COAL running as low as 30 in., Gauley Mountain Coal Co., Fayette County, West Virginia, had mined over 33,000 tons up to July 1 with experimental "scooters." The first scooter was built in the mine shop, in line with ideas furnished by Gilbert Smith, of Fayetteville, but to suit local conditions and conform with preferences of Gauley mine management a series of changes worked out by the shop mechanics evolved the design pictured in the illustrations. An average of almost 9 tons per man-shift delivered to the main sidetrack for several months includes labor of taking down, moving and setting up units in new rooms.

Working Thin Seam

Experimentation began Jan. 2, 1939, in Bryce mine of the company, at Jodie, but the machines of the newer design are in use at Agnew. For the most part, these have worked in a 30- to 34-in. area of the No. 2 Gas seam. Bottom is a hard slate; top in most of this particular section is a strong sandstone. Over the mine as a whole a 16- to 27-in. seam of Peerless coal lies above the No. 2 Gas, separated by an interval of a few inches to 27 ft. The No. 2 Gas lies practically level; grades, therefore, are not of consequence in consideration of mine layout or selection of mechanical mining equipment.

The units used in room work at Ansted consist of two essential parts: a steel box which is dragged with a rope and a dump which includes a double- or a triple-drum hoist. The box has a lift endgate in front and a slide endgate in the rear. This back endgate is attached to a tongue which extends to the front and is locked in place when the front endgate is in normal position. Head and tail ropes are fastened to the assembly of tongue and endgate; pulling the rear endgate forward through the box pushes the coal into the mine car. A skeleton construction across the rear end of the box provides openings for ejection of coal which may spill over the rear endgate as it crowds the coal out during dumping. Normally spillage does not occur unless the box is overloaded at the rear. Experience at Ansted has been with three sizes of box: 4x5 ft.x12 in., 5x6 ft.x7 in., and 5x7 ft.x12 in.

As assembled ready to operate, the dump is 7 ft. wide, 11 ft. long and 45 in. high. After removal of the endgate lifter or bail, removal of the 2-ft. apron at the end of the ramp and removal of anchor plates, dimensions are 7x9 ft.x28 in. The dump is mounted on 10-in. wheels (44-in. gage) and has a 54-in. wheelbase. Built to discharge into mine cars 23 in. high, the unit has an extreme operating height of 50 in. and can be used in a 4½-ft. seam without shooting a duck's nest over the dump and car. The hoist, permanently mounted under the top bed of the dump, is a Sullivan "Hauler" driven through a roller-chain reduction from a Louis Allis 15-hp. 550-volt 1,150-r.p.m. d.c. motor. Ropes are 6x37 hemp center; ½ in. used for the head and ⅜ in. for the tail. On the latest unit, rope speed is 500 f.p.m.; on the others, 400 f.p.m.

Pull Rope Lines Room

Two standard 44-in. gage steel ties are used to position the hoist and square it with the track. Ties are clamped at one end to the track rail and at the other end to a 7-ft. length of rail which slides into anchor plates of the dump frame. The head rope pulls through a sheave mounted on a roof jack on the heading straight across from the center of the dump. All sheave flanges are completely shrouded to prevent the rope wedging between wheel and side plates. With the steel ties holding the dump square with the track and the head-rope sheave set properly opposite the center of the dump, the pull-rope lines the room so no sighting from centers is necessary, provided the track is properly aligned.

Loading per car equals or exceeds

1—Empty box approaching the room face.

2—A three-man crew loads the box, but space often limits the efficiency of the third member.

3—The box is spotted almost against the face of the fall.

4—Dump operator at the controls awaiting the signal to pull a loaded box from the room face.

5—Starting up the ramp into the dump. A later unit has a straight ramp.

6—Loaded box in the dump; the bail has hooked the front endgate and starts to lift it.

7—Box endgate is completely raised, box travel has been arrested by hitting frame stop, and the coal is starting to spill out into the car.

8—Tongue now extends across the car and the rear endgate has been pulled to the front end of the box.

9—Rear endgate and tongue are moving toward the rear of the box at the start of the return trip.

10—Empty box leaving the dump ramp. Tongue and rear endgate are locked in normal position by the front endgate, whose lifting hook can be seen at the center over the head-rope attachment ring.

11—Dumping completed. *A* is the front endgate and *B* the bail which lifted it automatically. Box is stopped by the sloping block *C* engaging the dump block *D*. In a later unit, the ramp is straight and the box remains at ramp angle while dumping.

12—Dump as it appears from the operator's side. The steel tie in the foreground extends to the track rail at the lower left.

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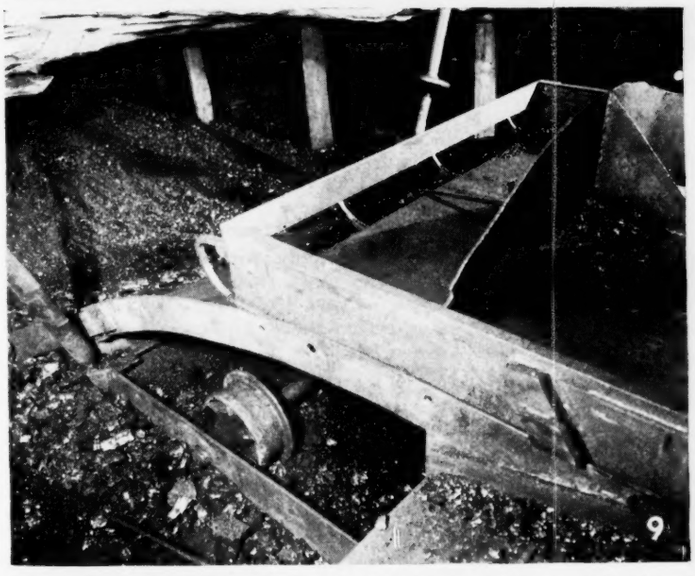
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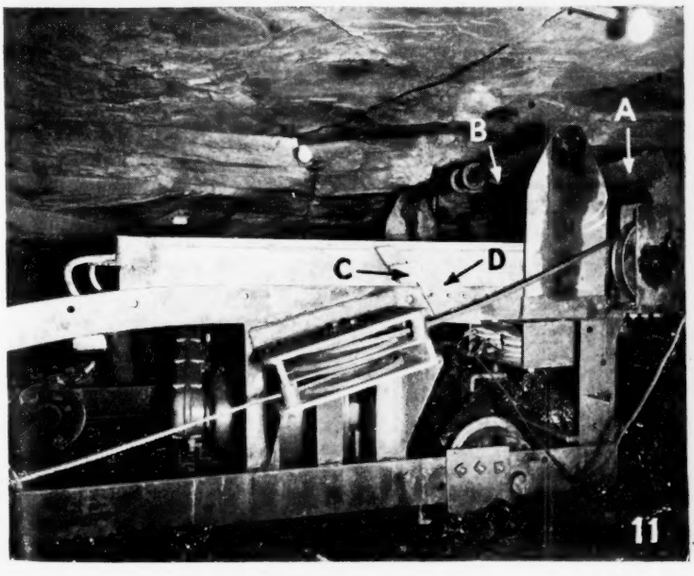

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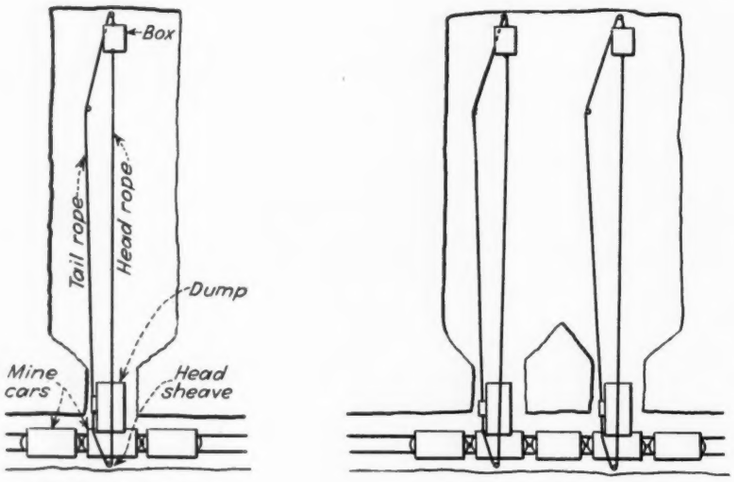


Fig. 1—Room work with the revised units at Ansted.

the 3-ton average for hand loading in the rest of the mine. In the section shown in the illustrations (pp. 48 and 49) loads were averaging 5,800 lb. and the limiting factor was low height on the room heading where no yardage has been taken. Car dimensions are 6½x11 ft. inside, and 23 in. high above the rail. Although the dump extends out only 2 in. over the edge of the car and the forward end of the box stops at a point only 12 in. out beyond the dump, the coal can be pushed so it heaps well over to the far side of the car.

Use Four-Man Crew

Experience indicates that in 32-in. coal 14 ft. from the edge of the box is the maximum coal can be shoveled without double handling and that 14 ft. from the center line of the box is better. Thus the room width for a single room set-up has been established at 28 ft. Rooms are worked regularly to a depth of 250 ft. and experiments to date indicate that 300 ft. is the practical limit. The number of men who can load efficiently into the box when it is placed at right angles to the face is three. Therefore, counting the dump-man who operates the hoist, a four-man crew is used. Performances of two units, movings included, are shown in the table at the right.

Two methods of spotting cars at the dump have been used. The dump unit last built has a triple-drum hoist and the third drum is adapted to that duty. Where track grades permit and safety is not jeopardized, a 5-ton Westinghouse cable-reel locomotive with brakes set slightly, controller on second point and power turned on and off at the dump, has been used for spotting. This same locomotive, operated by the dump-man, also hauls the trips 1,000 ft. to the sidetrack.

Between rooms suitable pillars are left to protect the territory during mining and to crush when the work is complete. Cover over the rooms illustrated is 300 ft. but the maximum over that section of the mine is 800 ft. Coal is undercut with a 550-volt Goodman 12AA machine but its height (25½ in.) has limited workings to coal over 30 in. thick. Recently one of these shortwalls was rebuilt in the mine shop to a height of 18½ in. Illustrations and a brief description appear on pp. 48 and 49.

Coal in this scooter section of the mine is practically free of separable impurity. Although in the room where the photographs were made the top is sandstone, the scooters have been worked under slate top where 2 to 3 in. has come down and had to be picked out at the face. It is gobbed in the ample spaces on each side of the scooter runway.

Drilling is done with a Chicago Pneumatic type PA model 5, size 571, 550-volt hand-held drill using twist augers with forged bit points. Shooting is done with Hercoal No. 2 permissible. The several holes of a face are fired simultaneously with a magneto, by special permission from the State Department of Mines. Power connections at the faces for mining machines and drills are made with Ohio Brass safety-type junction boxes each containing a quick-break line switch.

In an attempt to obtain greater tonnage per mining machine a double room set-up (Fig. 1) has been tried recently. A room center distance of 26 ft. was selected because the car centers distance in a coupled trip is 13 ft.; thus a car spotted at one dump automatically places another in the same relative position at the other dump.

With this double room set-up and a 52-ft. face, a five-man crew is used, four of the men generally working at the face and one at the dumps. Thus only one scooter is operated at a time and, although tonnage per mining machine and per man-shift is increased, the tonnage per scooter is reduced. As compared to the reasonably successful single-room set-up, experience with the double room has not been particularly favorable.

Scooter Heading Driving

With the scooter equipment built at Ansted, difficulties have been experienced with the type of mechanism tried at that mine to guide the box around turns, as is necessary for wide-faced room work with a single scooter and for driving breakthroughs and multiple-heading entries with one scooter and dump. Using the smaller box, 4x5-ft., considerable heading driving has been done, however, and efforts to iron out the difficulties are being continued.

The turn of 1940 marked the fifty-first year that the Gauley Mountain Coal Co. has mined coal at Ansted. The local management consists of R. H. Morris, general manager; R. H. Massey, superintendent of the Agnew mine; R. F. Overly, superintendent of Bryce mine, and G. E. Hoover, chief engineer.

Performance of Two Units of Slightly Different Design, Each Operated With a Four-Man Crew but Under Different Conditions

	Number of Shifts Operated	Total Tons Mined	Tons Per Shift	Tons Mined and Delivered to Main Haul, Per Man-Shift
Box 5x6-ft.x7-in., dump with curved ramp, in 30- to 34-in. coal, day wage work; rope 400 f.p.m.	102	3,576	35	8.76
Box 5x7-ft.x12-in., dump with straight ramp, in 40-in. coal, contract work; rope 500 f.p.m.	44	2,118	48	12

PERIODIC TESTING

Of Rail-Bond Return Circuits Unmasks Bad Joints—And Pays Big Dividends

By H. P. CHANDLER
Development Engineer
Ohio Brass Co.

MODERN mechanized mining with its heavy electrical loads at the face and its need for track mobility demands an efficient, practical bonding system. Modern rail-bonding technique, exploiting the advantages of the easily installed, easily reclaimed bond, offers the nearest approach to the ideal of having a continuous electrically perfect rail system with complete mobility of track.

The total resistance of the bonded rail circuit is the sum of the rail resistance plus the resistance of the bonded joints. Therefore, joint resistance usually is expressed in terms of "equivalent feet of rail." As an example: In computing the resistance of a mile of rail, the resistance of the rail plus the resistance of the joints may equal the equivalent of 1.10 miles of continuous rail; or even 1.25 or 1.50 miles, depending upon the bonding and its condition.

Great Losses Pegged

Where the return circuit is poorly or insufficiently bonded, the power losses so incurred can easily amount to $3,000 or more per year. To illustrate: Suppose we take an instance where the voltage drop at the end of the line is 25 per cent. The I^2R, or heat, losses are proportional to the drop in voltage of the circuit. Then if our combined locomotive and machine load in this area is 240 kw., the generating equipment must deliver 320 kw. to do the work. Thus the power loss is equal to the difference between these two figures, or 80 kw. Taken at an average rate of 2c. per kilowatt-hour, this power loss is wasting $1.60 per hour, or $3,840 per year, on the basis of 2,400 hours' operation.

Should the voltage drop as much as 40 per cent (not as unusual as one might think), we encounter a loss of 128 kw. In this case, $2.56 every hour is going up in "smoke." On the same basis, $6,144 is being wasted in heat losses, a large part of which may be chargeable to poor bonding, fair bonding, or something other than the right method of bonding. Although this loss frequently is chargeable to limited feeder capacity, the cause more commonly is inadequately or improperly bonded return circuit.

Because appearances are deceiving, a good bond cannot always be distinguished from a poor bond by visual inspection. Further, one cannot presume that a bond, once installed properly, will last forever without further attention. Bonds can and do become defective as a result of derailments, dragging equipment, track vibration and poor welds. It is these bonds that become troublemakers and increase the return circuit resistance beyond reasonable values.

So it is highly desirable and extremely profitable to inspect the condition of our return circuit periodically, to isolate these "bad actors" with their unreasonably high resistance and replace them with low-resistance bonding.

The instrument which seems to give the most satisfactory bond-testing results is a duplex millivoltmeter, or two millivoltmeters mounted on the same panel, answering the same purpose. In using a duplex millivoltmeter, three contact points, *A*, *B* and *C* (Fig. 1), with file edges are required. One contact point should be provided for each of the two bond terminals (*A*, *B*); the other contact point (*C*) is used to measure the equivalent length of rail. The middle contact point (*B*) is common to both meters. The millivoltmeter is made with two scales of reading, one from 0 to 20 millivolts; the other from 0 to 200 millivolts.

In testing the resistance of the joints, the first step is to connect the millivoltmeter so that the 0- to 200-millivolt scale is used. There is less

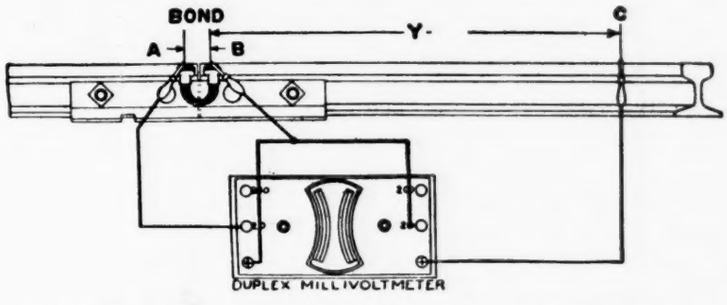


Fig. 1—Connections of the duplex millivoltmeter used in rail-bond testing.

danger of damaging the meter from overloading if the joint is high in resistance. Next, place contact points *A* and *B* across the ball of the rail at the bond terminals, using the file edges of the contact points to secure a good connection. The deflection of the pointer will indicate whether there is sufficient current flowing in the rail to complete the test, and whether or not the instrument is connected with the proper polarity to cause a forward deflection of the pointer. If insufficient current is flowing, it then becomes necessary to supply a load. This load is easily devised by using a standard resistance element. These elements, of course, are connected from trolley to rail. The 60-amp. load of these elements will furnish load sufficient for testing purposes.

After making certain that current is flowing in the rail, place the three contacts of the meter on the rail as shown in Fig. 1. Then move contact point *C* as far out on the rail as is necessary to make the pointers of both scales of the meter read identical. It is important to watch for cross bonds or connections or return feeders that may be connected between points *A* and *C*. These should not be included in the measurement, as an incorrect reading will result from the difference between the current flowing through the joint and the added current supplied by the feeder or cross bond. It is necessary to have the same current value flowing through the rail *B* to *C* as flows through the joint, *A* to *B*. When both scales of the duplex millivoltmeter read the same, the drop along the joint is then equal to the drop along *Y* feet of rail. As the current is the same in both sections, the resistance of the bonded joint *AB* equals the resistance of *Y* feet of rail. The added resistance of the bonded joint is therefore equal to *Y-AB* feet of rail.

How much resistance in feet of rail-equivalent is added to the joint is highly important. By a comparison with the standard for the same joint in good condition, this added resistance can be determined. The old-fashioned rule that a joint should test 3 ft. of rail or less has no significance and in many cases is entirely wrong.

Fig. 2 shows the added resistance expressed in length of rail equivalent to the bonded joint for various capacities and lengths of bonds and weights of rail when the bond is in the best condition. The actual unformed length of the bond, capacity of the bond and weight of the rail per yard must be known. From this chart, then, the comparison between the bond under test and a standard low-resistance joint may be had.

As a typical example, let us assume that we are testing a 40-lb. rail joint bonded with a 4/0 30-in. bond. Referring to Fig. 2, we first find the division at the bottom which compares with the bond length of 30 in.

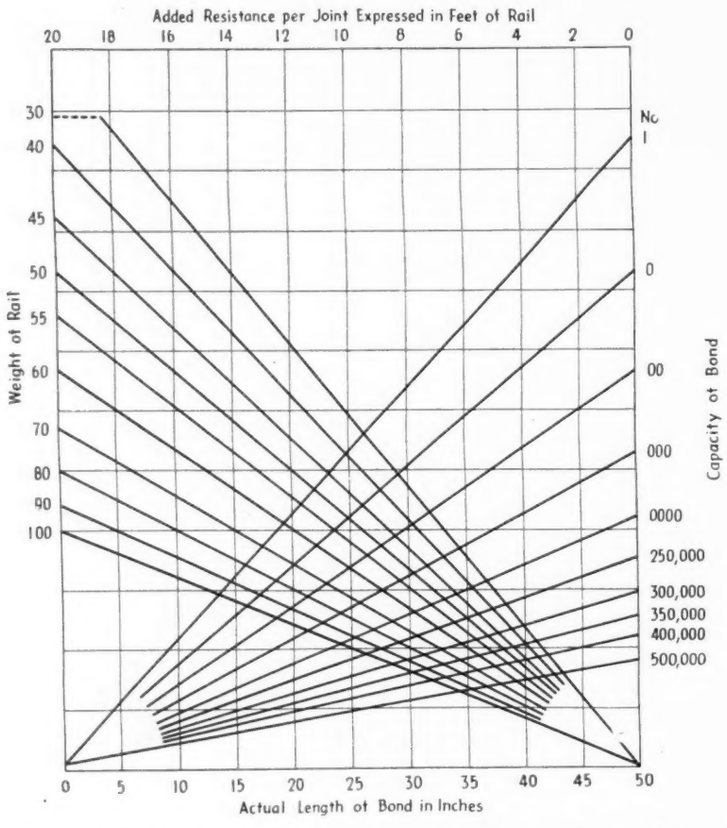


Fig. 2—Standard for a given bonding joint with which the actual condition of the joint under test is to be compared.

Fastest, most convenient method of bonding to meet the requirements of mechanized mining is afforded by the wedge-type bond—applied and reclaimed with a few simple blows of a 2-lb. hammer.

Having found that, we follow this line until it intersects the right oblique line marked 4/0 capacity. We then move horizontally until we strike the 40-lb. rail left oblique line; and, glancing at the top of the chart, we find the permissible economical rail equivalent of a bond in good shape to be 5 ft. Therefore, if in actual measurement, the bond in service as shown by the duplex millivoltmeter has a rail equivalent of, say, 12 ft., we know that that bond is poor, is wasting power, and is costing us money. It should be replaced; or a second bond applied around the old bond, thus getting use of both bonds.

Had this bond checked slightly over the permissible 5-ft. equivalent, we might decide not to disturb it or to rebond the joint. This is best determined in each individual mine by tak-

Left—A poor weld is one of the greatest bugaboos of return circuit construction. Be sure that welding surfaces are absolutely clean of scale, grease and other foreign elements, that your arc is used properly and that the welding beads are laid on in proper sequence. Right—Testing a rail joint by means of a duplex millivoltmeter.

ing into consideration the cost of power and the voltage drop allowable, consistent with efficient and economical operation.

One bad bond in a long stretch of track may never be noticed, either in loss of energy or damage to locomotive armatures; but twenty or thirty bad bonds in the same length of track will be a constant source of costly waste in power losses and slow-motion operation. Not only will power be saved by periodic bond inspections but a more even distribution of current also results from locating high-resistance joints and rebonding with good bonds; and the possibilities of armature burn-outs due to sudden fluctuations of voltage when the locomotives pass over bad joints is greatly reduced.

SUB-BITUMINOUS MINE

Cuts, Shears, Loads and Hauls

By Mechanical Means, Hoisting Coal Up Slope

MOBILE loaders have been in extensive use for many years in the Roundup coal district, Musselshell County, Montana, a coal region of limited area situated 50 miles north of the city of Billings. This district is part of the Bull Mountain field, which is not really as mountainous as its name would imply. It is an outlier of the widespread Fort Union Region, which covers the entire eastern end of the State and contains both sub-bituminous coals and lignites.

Though, even in this State of Montana, coals are found of more recent formation, the Roundup seam is well among the youngest of those operated in the United States, yet it is not a lignite but a true sub-bituminous coal; its thermal value places it at times in Series *A* and at others in Series *B*, which are the two highest series provided for that rank of coal. In fact, Montana has only a few coals with as high a calorific value; most give less heat and none give more.

In part this is due to the low-ash content of the Roundup coal but partly also because, though young in geologic years, it has been aged and coalified by the heat of a mountain-making movement. But to this fact little but the dipping of the beds of coal and rock testify, for the country near Roundup, especially to the north, is almost level, though to the south are some sand-sculptured rock ridges and to the west distant about 180 miles are the crests of the Rockies.

Confirming the contrast between surface and subsurface, in the Prescott mine of the Bair-Collins Co., situated within the limits of the town of Roundup, the bed being mined dips into the ground on an inclination of

Prescott preparation plant of the Bair-Collins Co., Roundup, Mont.

In a Montana mine operated mechanically as to cutting, loading and haulage, three principles protect the operations from squeeze: large pillars on the slope, long room necks, depillaring one level at a time. All coal is removed both areally and as regards seam thickness. Because of the cold weather in the busiest season, coal is cleaned by hand.

11.3 per cent, but now, at the lower end of the mine, it having approached the basin, it is dipping only 1.75 per cent. The slope, which runs south 23 deg. east, is driven about 14 ft. wide and is timbered, though the roof is good, being of sandstone, some of which is fine and some coarse. In places, fossil timbers can be traced in the roof, though not as clearly in this mine as in one adjacent. Apparently, the roof is not weakened by the presence of these fossil logs. Clay underlies the coal; seam thickness ranges from 5½ to 6½ ft., with an average thickness of 6 ft.

Contours run north 55 deg. east, and haulage headings 14 ft. wide, locally dubbed "cross headings," are driven in both directions at distances 400 to 500 ft. apart on an upward inclination of about 1 per cent. Back headings are of equal width. Pillars 15 ft. wide are left between the levels and their returns. Rooms 25 to 26 ft. wide are now driven due north at 50-ft. centers, 23 deg. off a line at right angles to the entry, leaving 24- or 25-ft. pillars. Formerly, the rooms were driven in other directions, but the present orientation gives the best result. No roof coal is left.

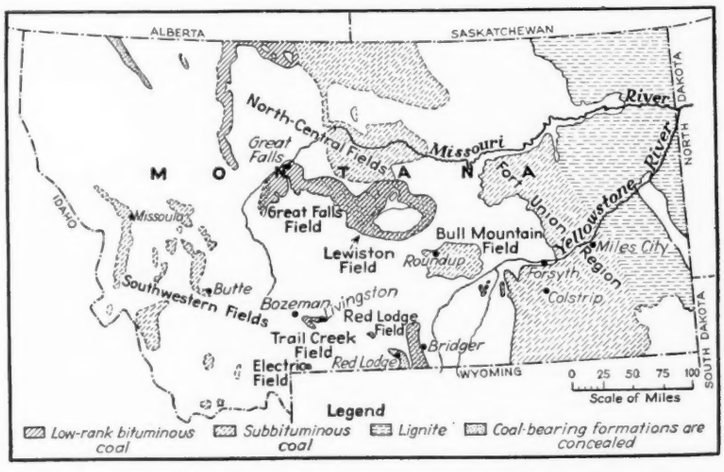
These working methods are feasible because the greatest depth of cover is about 400 ft., and most of the workings are much shallower. Moreover, the roof, though strong enough near the coal to sustain itself over a wide place and for a long time, is not strong enough as a whole to allow large areas to remain open when pillars are drawn. However, three precautions are taken: (1) On either side of the slope a 150-ft. coal pillar is left to act as a barrier; (2) rooms are not necked out until they have been driven 50 ft. and (3) pillars in a lower level usually are not drawn until those in a higher level have been removed. In general, crosscuts in the slope, levels and rooms are driven at 60- to 70-ft. centers.

Coal is undercut either by a Jeffrey or a Sullivan CLU arcwall machine. The Jeffrey unit is an undercutter. The other machine both undercuts and center shears. Track is laid with 16- to 25-lb. rail. When the rail twists under the load, it is straightened. Four to five holes are drilled about 2 ft. from the roof, angling upward so as to reach the top of the coal at the end of each hole. These are each charged with four or five 1½-in.-diameter sticks of pellet powder. The coal is not friable. In places there are bells in the roof, which, if not supported by timber, may fall unexpectedly. Only in the slope has trouble with cap rock been experienced; in places it was 6 in. thick, but usually it was absent. No dikes have been encountered. In all, roof conditions are quite favorable to safe operation.

For loading, four Joy 5 BU's mounted on caterpillars are used. Every year, these are all taken out of the mine in rotation and thoroughly repaired. To provide for the rapid placement of the 3½-ton cars behind these units, each third room has crosscuts driven through the pillars in both directions at 100-ft. intervals at an angle of 45 deg. to the direction of the room connecting this center room with the two neighboring rooms.

In these crosscuts, cars can be stored for prompt delivery behind the mobile loader, for which purpose one 5-ton General Electric locomotive and four 5-ton Baldwin-Westinghouse locomotives are provided. A 10-ton General Electric locomotive affords motive power for main haulage. Cars are pulled up the slope by a 250-hp. Ottumwa Iron Works electric hoist in trips of ten cars and dropped into the tipple by a back switch.

Water gives little trouble. A heading was driven under the Musselshell River, using for drainage only a 2-in.



Montana's many coal fields cover a large part of the State, especially the eastern half. The most recent coals are the sub-bituminous coals of the Southwestern fields, and the oldest the low-rank bituminous fuels of the Lewiston and Great Falls fields.

pump. Apparently, a 6-ft. bed of shale in the sandstone prevented the water from reaching the mine. Carbide lamps are used for illumination. Cutting machines and mobile loaders are actuated by 440 a.c. power; locomotives operate on 250 d.c. current; the electric hoist, on the other hand, receives 2,200 volts, a.c.

The bed mined at Roundup takes its name from the town and stratigraphically is near the bottom of the Tongue River, or upper, member of the Fort Union formation, which is in the Eocene series. Eocene coals are found also in the Fort Union, Red Lodge and North-Central fields, but practically all the coal being mined elsewhere in Montana comes from lower beds; that is, from the Upper, Middle or Lower Cretaceous series.

On arriving at the tipple, the coal is discharged by a Phillips crossover dump and the empty cars are returned by a kickback. The coal passes by a chute on a 12-per-cent inclination to a 40-in. belt about 150 ft. long. Ten pickers remove the impurities from the coal as it passes up the belt. It then falls on a shaker screen and is sized. The top deck has 2½-in., and the middle deck 1¼-in., and the lower deck ½-in. round holes. Product passing off the top of the middle deck, 2½x1¼, is sold as nut; 1¼x½-in. from the top of the bottom deck is pea, and ½x0 is designated fines.

Plus 2½-in. goes to a 4-in. bar screen, to take out 4x2½-in. coal, which is known as stove, and then to a 9-in. screen where the 9x4-in. coal is removed to be sold as furnace coal. Before the plus 4-in. coal goes to the 9-in. screen a 2½-in. round-hole screen removes undersize. Plus 9-in. coal goes to a "breaker," or crusher, and is reduced to about 6 or 7 in. and is returned to the incoming feed at the head of the breaker.

Five pickers clean the coal on the nut-coal belt and seven on the stove coal. Rubber tires are used to cushion the coal and reduce its speed above both the 2½- and 9-in. screens. Sometimes the small-size screen clogs and has to be cleared by rakes. Three box-car loaders are provided, two of which are Ottumwas. Practically all lump, stove, furnace and nut coals to be transported by rail are loaded into box cars. Arrangements are provided for loading furnace, stove, nut, pea and fines into motor trucks. Coal is loaded on three tracks.

The large number of slate pickers employed is the result of machine loading. It would be better to wash the coal, but the cold of the region, in the period of the year when the greatest demand occurs, has hitherto prevented the installation of washing equipment, though plenty of good water is available in the Musselshell River. Two shifts are worked daily with one shift extra for shotfirers, drillers and cutters.

ELIMINATING NITROUS OXIDE

From Mine-Locomotive Controls

Reduces Maintenance Costs; Cuts Dead Time

By C. C. WHITTAKER
Transportation Division
Westinghouse Electric & Manufacturing Co.

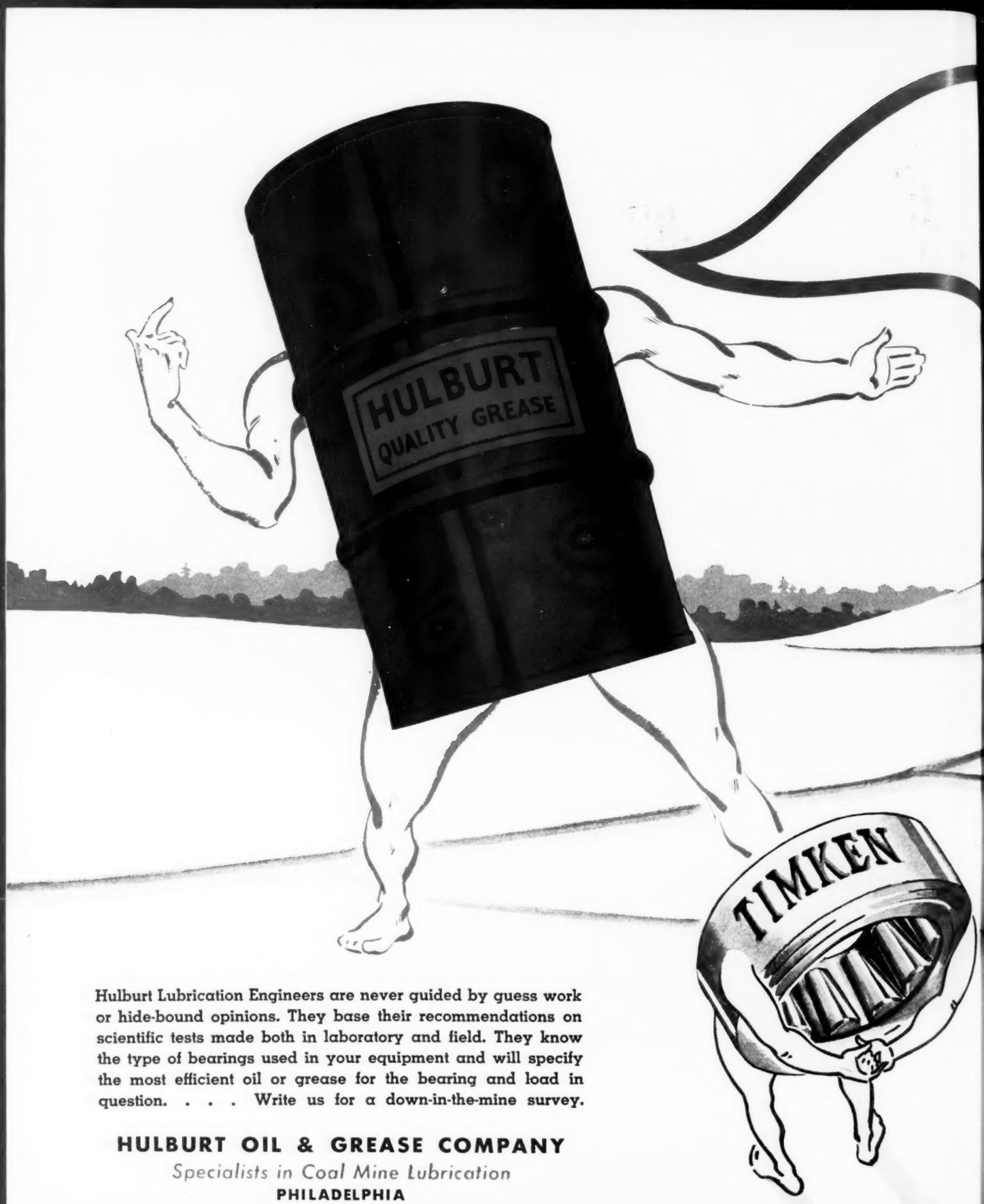
TOTALLY inclosed control compartments, such as are used on explosion-tested mine equipment, act like miniature nitrogen-fixation furnaces. The electric arc formed when current-carrying contacts are opened initiates a chain of events that have seriously detrimental effects on the electrical parts of the controller. This arc breaks up the air and liberates nitrogen. The free nitrogen combines with oxygen to form nitrous oxide which is deposited on all surfaces inside the compartment.

Nitrous oxide is deliquescent and combines with the moisture in the air breathed into the controller in its normal operation over a range of temperature conditions, forming nitrous and nitric acids. These acids are condensed on all parts within the inclosure, causing rapid disintegration of insulation and corrosion of metal parts. The deposits appear in the form of a dark-brown powder on all iron parts, a white deposit on asbestos and molded parts, and green copper nitrate on copper and brass parts.

When power is applied to equipment covered with the moisture-laden deposit, leakage currents distribute themselves promiscuously over its surface until the heat generated drives off the moisture. If the insulating materials over which these currents flow become carbonized, their insulating qualities are ruined and a destructive breakdown occurs. Then the equipment must be dismantled and repaired. This action is rapid; in some cases, totally inclosed controllers have failed completely in two or three months of service.

While this gummy deposit can be removed with the aid of kerosene and gasoline, it may have penetrated so deeply on insulation that its removal is impracticable. Moreover, this method is costly both in labor expense and lost locomotive-time. Frequent blowing out of the control boxes with compressed air will retard the corrosive effects.

When the control is new, or after



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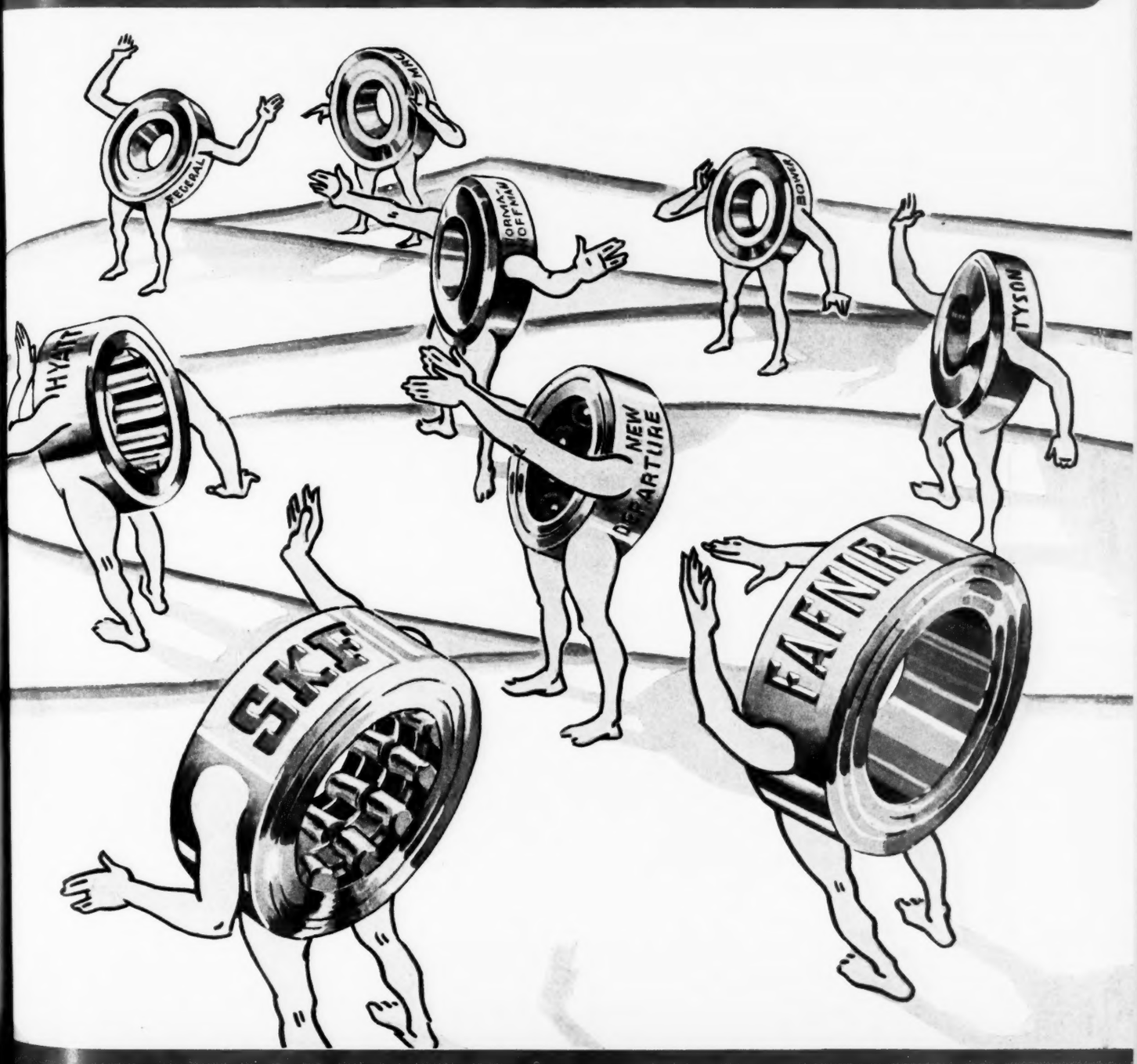


QUALITY GREASE

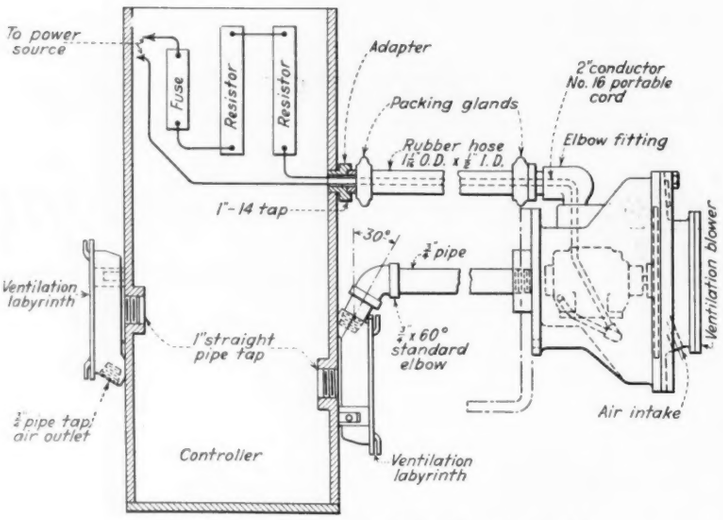


Fig. 1—Outline of ventilation labyrinth and assembly.

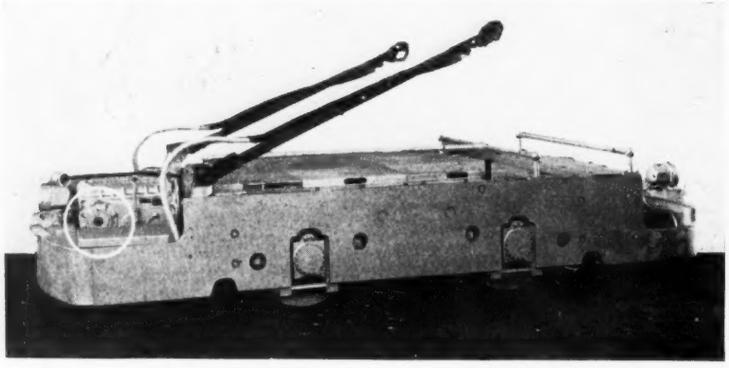


Fig. 2—Permissible mining locomotive with control box and breather (shown in circle) attached.

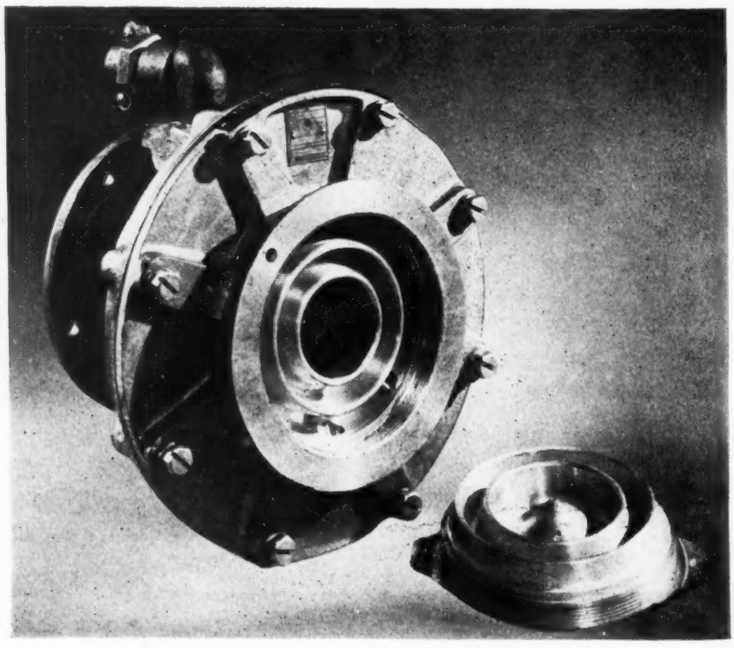


Fig. 3—Assembly of casing housing blower motor and fan with intake labyrinth disassembled to show tortuous passage of air.

it has been reconditioned, some relief may be secured by the judicious use of a special paint to protect those parts subject to corrosion. Care must be taken, however, not to paint flexible shunts, contact surfaces and not to put the paint on so thick that it runs into bearings, etc., as this will cause other troubles. Use of stainless-steel parts, such as springs and hinge pins, and micalex for insulation minimizes corrosive action, but increases the first cost and reduces maintenance only slightly.

Breather Construction

A breather mounted on the locomotive, experimentation has shown, will solve the nitrous-oxide problem. Construction of this device—essentially a small fan driven by a 1/50-hp. motor—is shown in Fig. 1. Air enters the blower housing through an intake labyrinth designed to pass the required air without permitting sparks from an explosion to pass out. The forced ventilation is carried from the blower housing by a ¾-in. pipe to the entrance labyrinth at the control box and thence into the box, where it mixes with any gas which may be present, dilutes it and carries it off through an exhaust labyrinth.

All three labyrinths have the same air-passage design. In cases where there is space to mount the blower within the control box or on the control box, the intermediate labyrinth is not needed. The device can be applied to old as well as new controllers. A commutator-type 115-volt direct-current motor operating on line voltage reduced by a series resistor is used. Brushes and motor bearings are the only parts of the device which require attention and these are easily accssible by unbolting the flange plate on which the motor is mounted.

Reduces Maintenance Costs

If not overhauled frequently, in a few months permissible controls will disintegrate to the point where flashovers and short circuits complete the destructions. These blower outfits have been tested both by the U. S. Bureau of Mines, in line with its usual tests for permissible-control boxes, and in the field. Service tests indicate that no trace of nitrous oxide could be found in control boxes so ventilated after two years of operation. On one property where the device has been in service for over two years, maintenance on each locomotive, it was estimated, had been reduced $200 per year and another $200 is saved because of the greater availability of the locomotive.

MODERNIZATION PROGRAM

At Puritan Mine in West Virginia Clips 2c. Off Power Cost; Ups Efficiency

Modernization pays! One of the fruits of a modest rehabilitation program started a year ago at the Puritan mine, in Mingo County, West Virginia, is a power saving better than 2c. per ton. In addition, the improvements in haulage and drainage which play a major part in these savings also are earning high returns in operating economy.

By J. H. EDWARDS
Associate Editor, Coal Age

CONCENTRATING largely on improvements in transportation and drainage, Puritan Coal Corporation in the last year has been able to effect a power saving of more than 2c. per ton at its operation in Mingo County, West Virginia. The program which made this possible included track welding, standardization on 50-lb. rail, regrading and relocation, where necessary, and new treated ties. A miscellaneous assortment of old pumps were replaced by new self-priming centrifugals with automatic controls; a demand limiter was restored to service and a 2,300-volt capacitor was installed.

Puritan mine is a drift operation in 4-ft. Upper Thacker coal with a badly heaving fireclay bottom. For the most part the coal lies nearly level, but local grades up to 4 per cent are encountered. These grades, the influx of some water and the unstable bottom introduced haulage difficulties that were throttling efficient operation. Normal production is 1,300 tons per day; 1,100 tons is hand-loaded into mine cars in a single shift; 200 tons comes from three-shift operation of two hand-loaded shaker conveyors. The tipple has a Menzies hydro-separator which washes the 1x0-in. coal.

Welded-Rail Return

Rail welding started in August, 1939, and 7,000 ft. of thermit-welded track had been installed by May, 1940. With this welded track the return leg of the power circuit is fixed to the ultimate for all time and joint maintenance completely eliminated. The 50-lb. relayer rail is being used to replace worn-out rails of various sizes. Track gage is 44 in. Zinc-chloride-treated ties are 4x7-in. x 5-ft.6-in. sawed hardwoods. Treatment is applied by the hot-and-cold method and the penetration is 5 lb. per cubic foot. All spike holes are drilled and a spike is driven partly in on one side before the ties are sent into the mine.

By doing two-thirds of the welding on the outside, at the lower labor rates in effect, the average cost per rail joint has been held to $5. In the yard, three rails of normal length are joined and the 90-ft. continuous rails then are taken into the mine by loads of four on special trucks and deposited beside the track ready for installation. Use of 90-ft. lengths also cuts track-laying costs because longer sections of the track can be completed at each "spell"—usually over a week-end or other normal shutdown period.

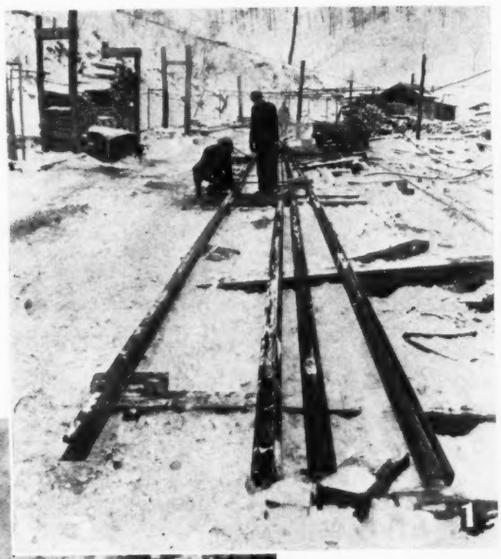
On the outside, welding follows closely the standard recommended pattern; instead of grinding to dress the joint, however, trimming with a chisel while hot and hammering the tread to secure a reasonably smooth surface is employed. Steps in this procedure are: cleaning with a chisel and wire brush, spacing and clamping rail ends in alignment, applying the mold, preheating rail ends, making the pour, and removing the mold and clamps. To save time in making welds inside of the mine, the regular clamp usually is omitted and rail ends are aligned by bracing from the roof or ribs where necessary.

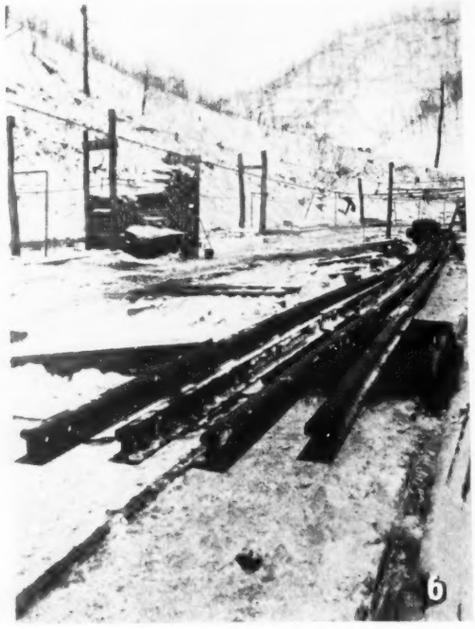
The two four-wheeled trucks of short wheelbase used in carrying rails inside are equipped with wooden bolsters and are placed 50 ft. apart. A 15-ft. drawbar extends from the front truck to the locomotive or mine car. Short steel tie-bars to which the four rails are held by clips such as are used on steel ties prevent the rails from rolling over when being hauled around curves. One tie-bar is placed ahead of the bolster of the front truck and another back of the bolster of the rear truck. A ½-in. wire rope of suitable length acts as a drawbar between the two trucks.

Graded Track Saves Money

The welded rails and new ties have been installed 1,000 ft. at a time over sections of track that were in the worst shape. In some swags the track was raised as much as 3 ft. and on the worst hills 2 ft. was graded off the top. Most of the treated ties on this track are oak or maple, but some beech is used. On a 3,000-ft. haul serving one section, a 10-ton locomotive hauling 25 loaded cars required a 6-ton pusher. Relocation of the track through headings already developed made it possible for either locomotive

Track-Welding Procedure at Puritan Mine





1—On the outside, three rails are joined by two welds to make 90-ft. lengths.

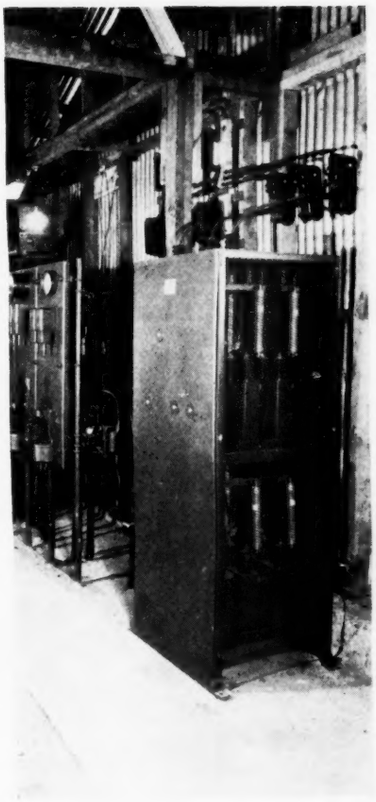
2—After cleaning the rail ends, alignment clips are applied.

3—Applying the mold takes only a short time.

4—Heating rail ends with an oil torch is the operation which takes the longest time.

5—The weld metal is melted and the plug has been pulled up to make the pour.

6—Ready to be taken inside: Four 90-ft., welded rails are loaded on two special bolster trucks; rails are spaced and held from turning by clamps resembling short steel mine ties.



A capacitor (right) was installed in the 300-kw. converter substation as an additional power-saving device.

to handle 25-car trips without assistance. The new route dodged a hill with a rise of 27 ft. against the loads and 13 ft. against the empties. For this job the existing 40-lb. rail was moved, but joints were not welded because that territory has a projected life of only five years.

Both electrical demand and energy consumption have been reduced by the improved haulage conditions. Reduction in quantity of track sand by reason of better grades and dry rails reacts favorably with the reduced load to lower locomotive maintenance costs.

Automatic Pumps Installed

Mine drainage was improved by replacing the entire miscellaneous equipment of worn-out and outmoded centrifugal and plunger pumps with five new LaBour self-priming centrifugal pumps and installing 3- and 4-in. steel discharge lines to decrease friction head and get away from the old practice of relaying water from one swag into another. Three of the pumps are size No. 10, one is a size 15 and the other a size 20. All are fully automatic in operation. As compared to a former labor expense of three 7-hour shifts, the mine drainage during normal weather is handled now by one man who works only on operating days.

One of the new No. 10 pumps, operating on the main haulway outby of Three Sidetrack, is driven by a new 3-hp. 1,750-r.p.m. 230-volt Louis Allis motor, as is illustrated below. The Clark controller used with this pump is shown on the right. The larger "Hydrobalance" pump (type DS, size 15), working in Six Flat Dip Off the Main, is driven by a General Electric 7½-hp. 1,750-r.p.m. motor formerly used on one of the old pumps.

In February, 1939, when a G.E. 60-kva. 2,300-volt capacitor was installed, the purchased-power contract was changed to take power factor into consideration. This capacitor is in an outside substation near a drift opening on Ferrel Branch and contains two 150-kw. G.E. 275-volt synchronous converters with manual starting equipment and automatic reclosing feeder breakers.

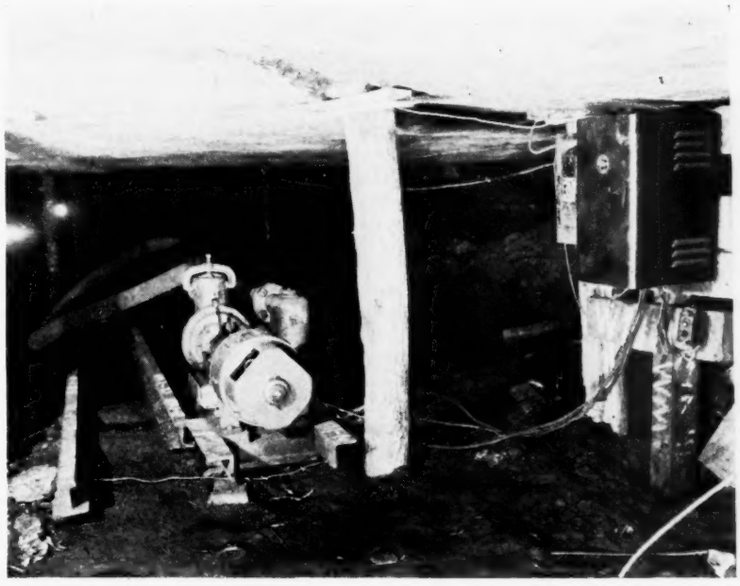
To further control purchased power cost, a demand limiter originally installed at the mine three years ago but later taken out of effective use, was reinstated to limit demand to 400 kva. by opening the main a.c. breaker which feeds the property. Previous to beginning the rehabilitation program, demand sometimes reached 500 kva. The West Virginia Engineering Co. cooperated with the mine electrician in correcting power distribution. Trolley of 4/0 size was used to double and even triple the copper where tests indicated the need. All track (including that replaced later with thermit) was double bonded and in one place a 4/0 wire was installed as additional return. To main sections the positive was increased with 500,000-circ.mil cable.

Until recently it had been the practice to use a resistance in the shop to arcweld from the 275-volt trolley line. With a closer check on demand, the power drag of this resistance welding evidenced itself by frequent openings of the main a.c. breaker. Now, since a new Westinghouse 300-amp. Flexarc motor-generator welder has been installed, the extra load by shop welding is not evident by operation of the limiter. Filling locomotive tires, a regular practice at the mine, is one of the shop jobs which accounts for a large part of the welding that is done.

Other Improvements Follow

Improvements have not been confined to features affecting power. A new sand house was built higher up on the fill accommodating the empty track, with the stove floor at the same elevation as the track, thereby reducing handling effort. Cap lamps were installed (Edison type K) and the new lamphouse is fitted with M.S.A. self-service racks.

Frank P. Harman, Jr., Washington, D. C., is president of Puritan Coal Corporation. Local mine officials include Frank C. Carothers, general manager; W. A. Robison, general mine foreman, and Savage Adkins, chief electrician and master mechanic.



All pumps in the mine were replaced with self-priming centrifugals; new controllers, such as the one at the right, and float switches make the units automatic.

NEW LIGHT ON OLD QUESTIONS

Roof, Face and Rib Testing if Closely Studied Will Reveal Hazards With More Certainty *

By JOHN E. JONES

Safety Engineer, Old Ben Coal Corporation
Benton, Ill.

EVERY phase of mining other than the theory and practice of determining the safety of the mine roof by sounding has had careful and elaborate study. Without such inquiry, men in the mines cannot be instructed as to what conditions may be expected to accompany each of the various sounds which issue from the roof when it is struck with tool or rod, what may be deduced from such conditions, and what action should be taken accordingly. In fact, most people have convinced themselves that no such study is possible and that there are only two classes of such sounds, one showing that the roof is free from defects and safe and the other demonstrating that it is loose and unsafe.

This lack of study does not arise from the fact that the subject is unimportant, for in the 57 years from 1880 to 1936 inclusive, of all the underground fatalities in the anthracite and bituminous mines of the United States, 53.4 per cent were caused by falls of roof and sides. However, it must be granted that some difficulty may be encountered in getting a complete utilization of the theory and practice of sounding when developed, for many persons because of their familiarity with danger are difficult to impress sufficiently; others, as on our highways, are prone to take chances, and possibly others have a tone deafness akin to color blindness.

Hollow Sound Indicates Space

When sounding a loose piece of rock or coal, it may give a "loose sound," so long as it is in place, but, on removal from the roof or seam and fallen on the floor, it certainly will be freer than ever before, but it may then give an indication of soundness, for in itself it may be sound, and its weakness, when in place, is due only to its imperfect attachment to the roof. It is clear that the sound vibrations are dependent not only on the loose rock itself but on the spaces by which it is surrounded. Character of space is often more determinative than the character of the loose rock.

Sound is the vibration of a solid, liquid or gas medium, a vibration in which parts of the medium are contracting while other parts are expanding. The number of vibrations per second, or "frequency," determines the "pitch," or acuteness, of the sound. The human ear can detect 10 to 20,000 vibrations per second, though at the lower frequency such vibrations scarcely can be heard. However, the human hand, unlike the human ear, is quite sensitive to low-frequency vibrations. Note how a book held in the hand will be made to quiver by the bass tones of a pipe organ. Because of this, an excellent way of recognizing certain unsoundnesses of the roof is by holding one's hand or a rod against the rock being struck or "sounded."

As the number of vibrations per second of a tuning rod depends on its length, or the number of vibrations of a drum is related directly to its diameter, so with a piece of rock which is caused to vibrate, the number of its vibrations per second should depend on the free length of the cavity above it or on the span of the opening.

Thin Rock Gives Loud Sound

Amplitude is the maximum distance that the vibrated body is pulled or driven from its position of rest. Thus, the amplitude of the rock wave is the greatest distance the rock is caused to deflect, or bend, by reason of the blow. On that largely depends the loudness of the sound. If a drum is hit hard and the diaphragm accordingly is forced inwardly for some distance, the sound will be great in accordance with the amplitude. If, similarly, the rock is thin, and the cavity above it closed as in a drum, the amplitude and resonance will be considerable and the sound will be loud. However, sounds are rarely simple but consist of a tone and some overtones and of noises, which last must be defined as irregular vibrations not mathematically related.

Two types of sounds are recognized as arising from the striking of the roof: a musical note, which is natural to the rock, if there is no deadening of the vibration, and a drumming sound. To these, it is suggested, a third sound, the "thud," should be added, a treacherous sound that may be noted with both loose rock and coal. The sounds made by a rock when caused to vibrate can be deadened by contact with another rock or rocks, much as a sound from a vibrating string can be damped by touching the latter with the finger.

A crack in a rock will alter the sound it emits, as the vibration of the part sounded will be damped by the other part of the rock, just as the vibration of a string is damped by the finger, and this makes the clear ringing sound of the solid rock change to a thud or cushioned sound.

Sound waves created at the surface of the vibrating loose rock also may be damped immediately by the contact of the vibrating rock with the adjacent or backing rock. A thud is a sound of limited duration; it lacks the clear ring of a roof free of defects or has that sound materially impaired.

Like the sound from a drum is that coming from a piece of loose roof free to vibrate unchecked by damping except at its edges. In a drum, the blow is administered to one of the diaphragms, stretched across one end of the cylinder; this sets the air in the drum in vibration and the waves are carried across to the far side of the instrument, where they meet with the diaphragm over its opposing end. Here the waves, having set the far drumhead vibrating, begin their return journey.

Whence Comes Drummy Sound?

Wave and counter wave occur in a fraction of a second, for air (even at the freezing point) transmits sound waves at a speed of 1,088 ft. per second and the distance between the diaphragms of the drum may be less than a foot. The vibration is reflected back and forth between the two parchment drumheads, and the reflected wave does not strike the second drumhead at the phase at which that drumhead is vibrating.

By the expression "phase of a motion" is meant its timing; thus the greatest compression in one vibrating body may occur at a somewhat different time from that in another, though both may have the same number of vibrations per second. Because of this difference of time, the rolling sound characteristic of a drum can be detected. Widths of rock cavities usually being measured in inches and tenths of inches instead of feet, the difference of phase is much less than with a drum.

Like the drum parchment, the horizontal rock or coal surface when struck with the sounding tool at right angles to its planes of lamination begins to vibrate. This energy may be transferred rapidly to some cavity existing in the roof, which the vibrations promptly reach, for if the roof is of shale, the vibrations will travel at a speed of 11,417 ft. a second, and with other materials may be somewhat similarly speedy.

The air or other gas in the cavity will be set in vibration and these vibrations will be carried to the back surface of the cavity. The back surface (which usually parallels closely the front surface), the medium in the cavity and the front surface, all are

* First of two articles on roof sounding.

Of Interest to Readers of This Department

How to boost safety and efficiency in mechanical loading is outlined by a loading-machine operator on page 40, with practical suggestions that any foreman will do well to read. Electrical foreman and mine foremen also will find the article on page 51 helpful not only in saving current but in keeping equipment efficient and peppy. You can't keep machines in shape if voltage of return current at machine is high, so return circuits should be kept in pink of condition. The article on the West Virginia safety system, on p. 37, also will interest foremen.

set in vibration at the same frequency but in different phase, and therefore the sound is drummy.

If the cavity is too far above the point where the blow is struck, the drum action may fail to cause the rock to make a sound like a drum. If the backing rock is too rough or angled differently from the front rock or the two, while similar, are shifted a little in position, the two sides may make contact and the sound will be damped, giving a thud instead of a drum sound.

Fig. 1 shows what happens when the rock is solid. Overlooking the damping effects of the posts, the sound travels in the rock equally in all directions, forming waves in the shape of hemispherical domes, but only the vertical plane through these domes can be shown in the illustration. Each dome, therefore, is represented in the cross-section by a semicircle. However, assuming the room or other opening to be 30 ft. wide and the scale 0.08 in. to the foot, putting the lines at 2-ft. intervals, these semicircles each show the front of the impulse wave at a definite interval of five-thousandths of a second. The speed of sound in the air is about a tenth as rapid, so the smaller semicircles dropping from the roof are only about 0.2 ft. distant and also represent times five-thousandths of a second apart. As the roof is sound, the waves radiate freely until they disappear.

Cavity Vibrates Like a Drum

But in Fig. 2 it will be noted that the sound waves in their progress meet a cavity in the roof not far from the point where the blow is struck. A break like that shown in this figure frequently occurs in laminated roof, especially where loose drawslate, top coal, or both occur. With such a cavity, a drummy sound will result when the rock is struck.

Similarly, a flat rock laid on the floor can be caused to give a drummy sound when it is struck on its top surface, provided the floor is smooth and is cleaned so that the air space between rock and floor is sandwiched between reasonably flat surfaces. A more resonant drum sound can be obtained if the outer edge of the air space (the circumference of the edge resting on the floor) is sealed, as with putty. This establishes a condition similar to that which occurs when a loose rock in the roof has a

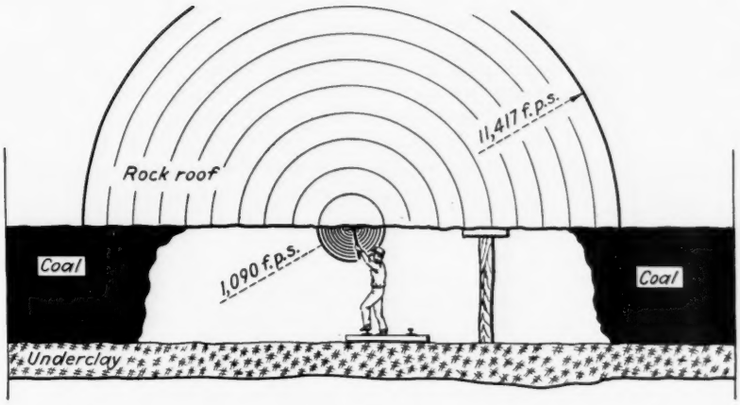


Fig. 1—Sound waves in solid roof. With no interference the waves in the rock continue on their way and there is no resonance.

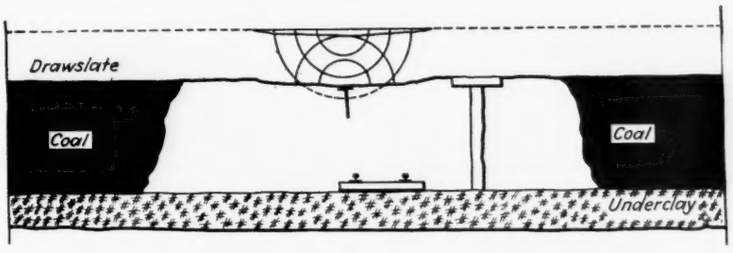


Fig. 2—Sound waves in loose drawslate. Waves, reaching a cavity, form waves in the air or methane of the cavity and return to the sender.

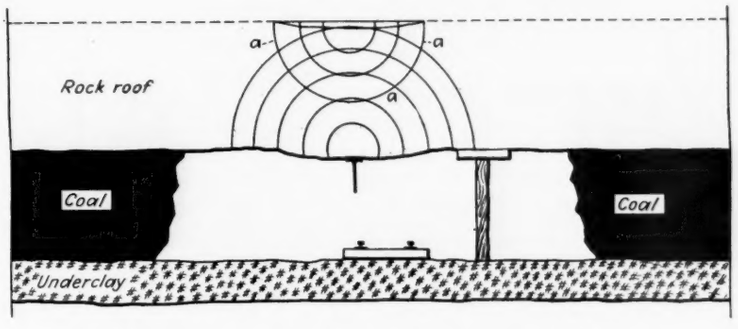


Fig. 3—Cavity too distant for the return waves to reach sender.

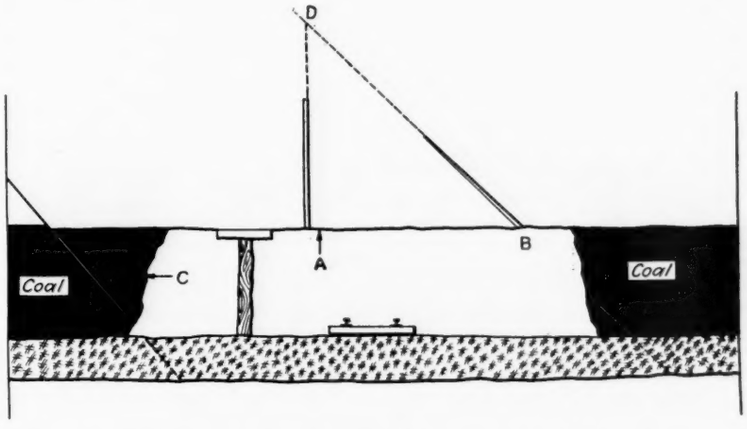


Fig. 4—Here pitching slips do not permit the roof to make a drummy noise on being struck, so sound is deceiving.

closed air- or methane-filled space between it and the main roof.

In Fig. 3 the loose rock is so thick between point of sounding and cavity that the reflected sound cannot reach the listener. The advancing waves reach the cavity, but the audible reflection waves apparently cease at *a*; those reaching the listener are too weak to be heard. Hence, the sound waves at the roof surface will predominate, and a solid ring sound will be all that is audible. Close attention will reveal more or less of a thud sound from the damping effect of overlying rock.

Near *A*, in Fig. 4, a vertical crack is shown, the air in which is little affected by tapping at *A*, because the tapping is along the crack rather than at right angles to it. Sounding at any point near the crack, therefore, will not disclose by sound the presence of this defect. To strike a blow at *A* would be like striking the drum parchment edgewise instead of flatwise.

At *BD* in the same figure is an inclined slip. Quite frequently such slips approach an angle of 45 deg. to the horizontal, but occasionally they are even flatter than 30 deg. Usually they lie between 30 deg. and the vertical, and when they are so angled, as between points *A* and *B* in the illustration, they will not cause any drummy sound when the roof is sounded. Hence, in Fig. 4 are shown two quite dangerous slips, and the rock below their intersection is quite ready to fall, but tapping the roof will give little or no indication of weakness, which is a reason why accidents frequently result from such conditions.

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Second Grade Mine Foremen's Examinaton—Pennsylvania, April 3, 1939

The following questions are those actually presented at the second-grade bituminous mine foremen's examinations in Pennsylvania in 1939. The answers are those prepared by the committee which propounded the questions and were the basis for marking the papers. The percentage awarded for a correct reply follows each answer. Experience is rated at 20 per cent.

Hauling and Traveling Ways

Q.—State legal requirements of following:

(a) Size, spacing and conditions of shelter holes on mechanical haulage roads.

(b) Dimensions and conditions of traveling ways.

(c) Inspection of haulage roads.

A.—(a) As amended by Act No. 464, July 1, 1937, on all hauling roads in entries driven after the passage of this amendment on which hauling is done by machinery, shelter holes shall be cut into strata not less than 4 ft. deep and not more than 4 ft. wide and level with the road and not more than 15 yd. apart, kept whitewashed and clear of obstruction. Room entrances may be used, provided that intervals do not exceed 45 ft. and entrance is kept clear of obstruction for a distance of 6 ft. All shelter holes shall be made on same side of entry. (2 per cent.)

(b) In all mines where coal seam is less than 3½ ft. high, such traveling way shall be at least 4½ ft. high; in all mines where the coal seam is 4 ft. high, such traveling way shall be at least 5 ft. high; and the width shall not be less than 6 ft. All such traveling ways shall be well drained, kept free from refuse of all kinds, and free from smoke, noxious gases, and electric wires, unless said wires are so placed and protected as not to endanger life, and are kept in safe condition. (2 per cent.)

(c) The mine foreman shall see that the roof and sides of all passageways over or through which men are transported in a car or cars shall be examined by a competent person or persons within three hours before the appointed time for the day shift to enter the mine. Report of said inspection shall be recorded in record book. (2 per cent.)

Electricity

Q.—Give legal requirements as to following:

(a) Installation and guarding of trolley wire.

(b) Installation and guarding of feed lines and cables along haulageways.

(c) Bonding.

(d) Grounding of electrical installations.

(e) What persons are permitted to enter a transformer or generator room inside a mine.

A.—(a) As amended by Act No. 464, July 1, 1937, after the passage of this amendment, all trolley wires installed in underground roads shall be placed as far to one side of the passageway as is practicable, but not less than 6 in. outside of line of rail, and securely supported upon hangers which shall not be more than 24 ft. apart, and efficiently insulated.

At all landings and partings or other places where men are required regularly to work or pass under trolley or other bare power wires, placed less than 6½ ft. above top of rail, a suitable protection shall be provided. This protection shall consist of placing boards along the wire, which boards shall not be more than 5 in. apart nor less than 2 in. below the lowest point of the wire: Provided, That on curves the distance between boards may exceed 5 in. but shall not exceed 8 in. This does not prohibit the use of other approved devices or methods furnishing equal or better protection.

All branch trolley lines shall be fitted with an automatic trolley switch or section insulator and line switch, or some other device, that will allow the current to be shut off from such branches. (3 per cent.)

(b) All underground cables and wires, other than trailing cables, unless provided with grounded metallic covering, shall be supported by means of efficient insulators. Where the cables or feed wires, other than trolley wires, in main haulage roads cannot be kept at least 12 in. from any part of the mine car or locomotive, they shall be specially protected by proper guards. (2 per cent.)

(c) On main haulage roads both rails shall be bonded, and cross bonds shall be placed at points not to exceed 200 ft. apart.

Where air or water pipes parallel the grounded return of power circuits, the return shall be securely bonded to such pipes at frequent intervals. The rail capacity shall be sufficient for current used, without the pipe capacity. (1 per cent.)

(d) As amended by Act No. 464, July 1, 1937, all metallic coverings, metal armoring of cables, and the frames and bedplates of generators, transformers, and motors shall be effectively grounded, as shall also the neutral wire of the three-wire continuous current systems. (1 per cent.)

(e) No person other than one authorized by the mine foreman shall enter a station or transformer room, or interfere with the working of any apparatus connected therewith. (1 per cent.)

First Aid

Q.—(a) If you found a man in contact with a live electric wire, explain in detail how you would remove him. (b) Explain in detail how you would perform first aid on him.

A.—(a) If a switch is near by and is between the victim and the power house, I would open the switch to cut off the power, or take a drill, auger or a piece of wire and throw it quickly across the electric wire and the rail, being careful to release my hold before it touches the live wire. By this act the circuit breaker will be thrown out and the current cut off. A shovel may be used to pull the victim off the wire. Other means may be used, such as taking your belt, hemp rope or some other article to pull him off the wire. If an ax is at hand, the wire can be cut. Take precautions to prevent being shocked by wrapping the handle with your coat or some other article if the handle is wet. A dry board or cloth may be used to pull the wire away from the victim. (4 per cent.)

(b) Place the victim in a safe place, send for a doctor, and in the meantime lay the patient on his belly, one arm extended directly overhead, the other arm bent at the elbow and the face turned outward and resting on hand or forearm, so that the nose and mouth are free for breathing. An assistant should remove from the patient's mouth all foreign bodies, such as false teeth, tobacco, gum, etc., and loosen the tight clothing from the victim's neck, chest and waist.

Kneel, straddling the patient's thighs with your knees placed at such a distance from the hip bones as will allow you to place the palms of the hands on the small of the back with fingers resting on the ribs, the little finger just touching the lowest rib, with the thumb and fingers in a natural position with the tips of the fingers just out of sight.

With arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the patient. The shoulder should be directly over the heel of the hand at the end of the forward swing. Do not bend your elbows. This operation should take about two seconds.

Now immediately swing backward so as to remove the pressure completely. After two seconds swing forward again. Thus, repeat deliberately twelve to fifteen times a minute the double movement of compression and release, a complete respiration in 4 or 5 seconds.

Continue artificial respiration without interruption until natural breathing is restored; if necessary, four hours or longer, or until a physician declares the patient dead.

Keep the patient warm. Do not give any liquids whatever by mouth until the patient is fully conscious.

If the doctor has not arrived by the time the patient has revived, he should be given some stimulant, such as one teaspoonful of aromatic spirits of ammonia in a small glass of water or a hot drink of coffee or tea. (6 per cent.)

Safety

Q.—Which of the following conditions have had a direct effect upon increasing accidents in coal mines? Check two.

(a) Introduction of mechanical mining.
(b) Physical examination of employees.
(c) Less working time and shorter work day. √ (1 per cent.)
(d) Economic conditions of the bituminous mining industry, due to the increased use of gas and oil, replacing bituminous coal. √ (1 per cent.)
(e) Increased capacity of mine cars.

Ventilation

Q.—If 30,000 cu.ft. of air per minute is passing through an airway 6 ft. high, 8 ft. wide and 5,100 ft. long, at a 1-in. water gage, what will be the water-gage reading if the velocity of the air current is doubled, but the length of the airway remains the same? How will this change affect the power? Give rule or formula.

A.—Other conditions remaining the same, doubling the velocity also doubles the quantity. In this problem, to double the quantity requires four times the pressure, or 4×1 equals a 4-in. water gage.

Formula: $\frac{60{,}000^2 \times 1}{30{,}000^2} = 4$ in. water gage.

The horsepower varies as the cube of the quantity. In this problem, to double the quantity requires eight times the power.

Formula: $\frac{60{,}000^3}{30{,}000^3} = 8$ times the power. (4 per cent.)

Q.—(a) What is minimum quantity of air required by the mining law?
(b) What are minimum and maximum velocities of air required by mining law?
(c) When and under what conditions would you decide it necessary to split air current in mine?
(d) When has effective limit of splitting air currents in a mine been reached?

A.—(a) 150 cu.ft. per minute for each person employed, minimum quantity of air and as much more as one or more of the inspectors deem requisite. (1 per cent)

(b) Mining law has no requirements for maximum or minimum velocity. (1 per cent)

(c) It would be deemed necessary to split the air current in a mine when there are more than 70 persons in one split, and also when the efficiency of the fan drops below its rating due to excessive resistance offered by restricted or extremely long airways. (3 per cent.)

(d) The practical limit has been obtained when the volume is such that further splitting would reduce the volume to such extent that it would be insufficient to dilute, render harmless and carry off all smoke or noxious gases, or when further splitting would reduce the volume of air below the minimum amount required by the mining law. (3 per cent.)

Explosions

Q.—(a) What are the chief causes of explosions in non-gaseous mines?
(b) What would you do to prevent them?

A.—(a) By accumulations of coal dust being suspended in the air by wrecked trips and ignited by an arc from electric wires which have been knocked down by any wreck, by blown-out shots, by too heavy blasts in grading or making overcasts and ignited by the flame from the blasts. By accidental detonation of explosives being hauled into the mine. By the suspension and ignition of coal dust by mud capping. (4 per cent.)

(b) Keep the mine free from accumulations of coal dust, by cleaning up, thoroughly watering or by substituting for water the proper application of rock dust which will render coal dust on the sides, bottom and timbers inert to explosibility. As to blown-out shots, use permissible explosives, tamp the full length of the hole with clay for stemming, fire all blasts with electric batteries, employ competent shotfirers, fire only one shot at a time, have all coal properly mined before blasting, and follow the provisions of the law relative thereto. In blasting roof for grading or making overcasts, should not overcharge holes. Prohibit practice of mud-capping when blasting.

No black powder, high explosives, or detonators shall be hauled on any electric motor trip in any mine, or carried by individuals through passageways in mines in which electricity is used or conducted, unless the same are incased in non-conductive boxes or receptacles made of material approved by the Secretary of Mines. Use of "blasting fuse" for igniting or firing explosives in any mine is forbidden, unless the fuse be ignited electrically. (6 per cent.)

Mine Gases

Q.—Name the non-explosive gases found in coal mines, give their symbols and specific gravities. What are their effects on life and combustion?

A.—Carbon dioxide, CO_2; specific gravity, 1.529; nitrogen, N; specific gravity, 0.971. Carbon dioxide is not combustible, it will not support life or lights; will cause death by suffocation if breathed in large percentage, and headache and nausea if breathed in small percentage. Nitrogen is not combustible, will not support life or lights; will cause death by suffocation if breathed, when oxygen content is below normal. (3 per cent.)

Mining Laws

Q.—What are the mine foreman's duties relative to the following questions:
(a) How much time is required of him in the performance of his duties, and over what is he required to keep careful watch?
(b) When and where must he measure the air in circulation and what records must be made of the measurements?
(c) What are his duties relative to timbering properly a working place and to supplying workmen with timber?
(d) What inspections of a mine must be made by a mine foreman or his assistants?
(e) What are the requirements relative to spragging coal that is being undermined, center-mined, or top-mined?

A.—(a) He shall devote the whole of his time to his duties in the mine when the mine is in operation and shall keep careful watch over the ventilating apparatus, the ventilation, airways, traveling ways, timbering and drainage, and shall see that all stoppings along airways are properly built. (2 per cent.)

(b) He or his assistant shall, at least once each week, measure the air current at or near the main inlet and outlet airway, and also in the last cut-through in the last room and in the entry beyond the last room turned in each entry, and make a record of said measurements in a book provided for that purpose, designating the place, the area of each cut-through and entry separately, the velocity of the air in each cut-through and entry and the number of men employed in each separate split of air with the date when measurements were taken. (2 per cent.)

(c) As amended by Act No. 464, July 1, 1937, the mine foreman shall direct and see that every working place is properly secured by props or timbers, and shall see that no person is directed or permitted to work in an unsafe place, unless it be for the purpose of making it safe. He shall also see that workmen are provided with sufficient props, cap-pieces, timbers, lagging, and wedges, all of which shall be reasonably suitable in size, and delivered to their working place or places. He shall also see that props are cut square at both ends and as near as practicable to the proper length required or designated for the place where they are to be used. (3 per cent.)

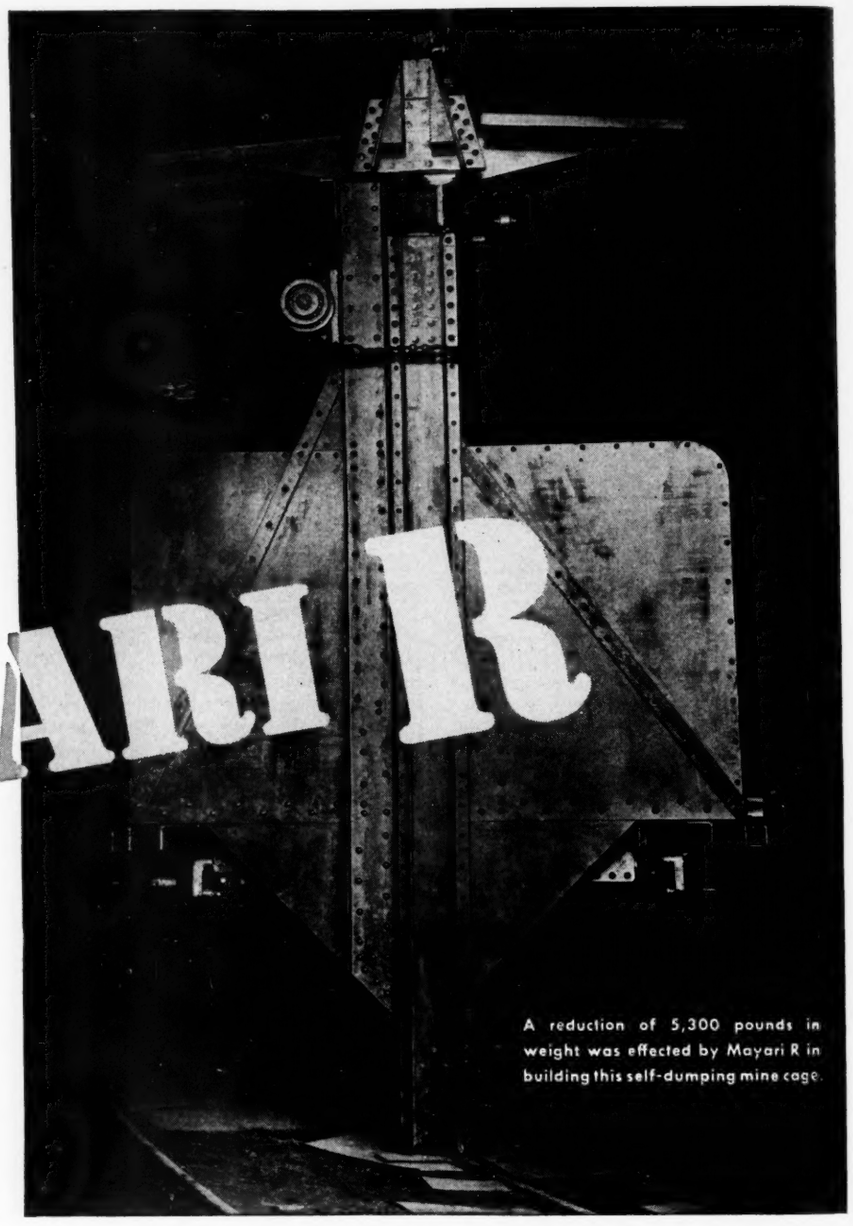
(d) He or his assistant must visit each working place once each day while the employees are at work and give special care, oversight, and attention to the men drawing pillars, particularly when falls are thereby being made. He or his assistant shall once each week travel and examine all the aircourses and roads and all the openings that give access to old workings or falls. (1 per cent.)

(e) He shall direct that the miner set sprags as often as necessary, at a distance not exceeding 7 ft. apart, under the breast of undermined or center-mined coal for safety. Would use the same system of spragging for top-mined coal as is used for center-mined or undermined coal. (1 per cent.)

Plenty of

Plus + Factors

with



A reduction of 5,300 pounds in weight was effected by Mayari R in building this self-dumping mine cage.

MAYARI R is providing positive advantages to coal mine operators in a wide variety of uses, such as mine cars, mine car parts, chutes, screens, buckets, cages, skips, loaders, agitators, tipples, washers, bridges and structural members. In design of new equipment or for maintenance of old, there are opportunities to profit by the characteristics of Mayari R—

+ Reduced weight, up to 50 per cent with the same strength.

+ Increased strength with the same weight.

+ Corrosion resistance, 5 to 6 times that of mild carbon steel.

+ Greater impact and abrasion resistance.

+ Long life.

+ Long-time economy.

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WORKABILITY—similar to mild carbon steel, with only minor allowances for Mayari R's greater strength.

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USABILITY "AS ROLLED"—as it comes from the mill it has full physical properties, no heat treatment being necessary before or after using.

AVAILABILITY—in all the usual shapes—sheets, strip, structural shapes, plates, bars, rivets and cold-formed sections.

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The finished-job cost of Mayari R is practically equal to chat of ordinary steel, with the advantages of reduced deadweight, increased payload capacity, longer life, reduced maintenance and longer spread of investment.

Catalog on request

A catalog describing Mayari R will be sent on request. You will be interested in the practical suggestions it contains for the most efficient use of Mayari R.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

WHAT'S NEW IN OPERATING IDEAS

Loading-Machine Tool Box Made From Oil Drum

A loading-machine tool box improvised from a discarded steel oil drum is described by James Thompson, superintendent, Cadogan mine, Allegheny River Mining Co., Cadogan, Pa.: "The barrel having no openings except a 2-in. hole in which the faucet was to be placed, we placed it on end and used an acetylene torch to cut a door in it 12 in. wide and 24 in. high. Next we electric-welded hinges and a hasp to the door, also welding around the door and its frame a small strip of strap iron for strength. The barrel being 35 in. high gave plenty of room for a shelf, which we made of $\frac{3}{16}$-in. scrap iron and placed about midway between the top and bottom.

"After painting and placing a lock on it, all we had to do was 'roll out the barrel' and we had a tool box ready to send in to the mine for the storage of tools and repair parts. Each loading-machine operator was given a key to the box, and it is working out very satisfactorily. I may add that our mechanics, Harold Kane and Albert Round, transformed the barrel into a tool box in less than two hours."

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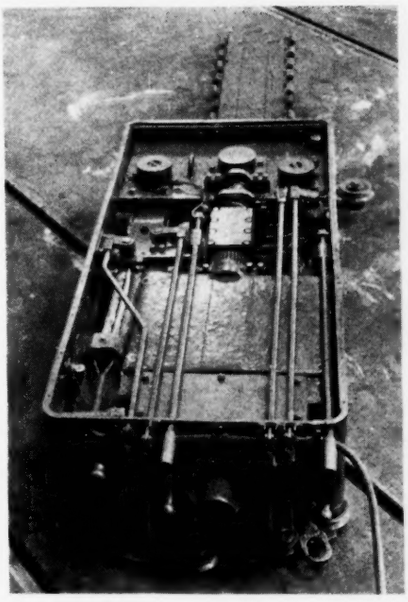
Cutter Height Reduced 7 In. By Complete Rebuilding

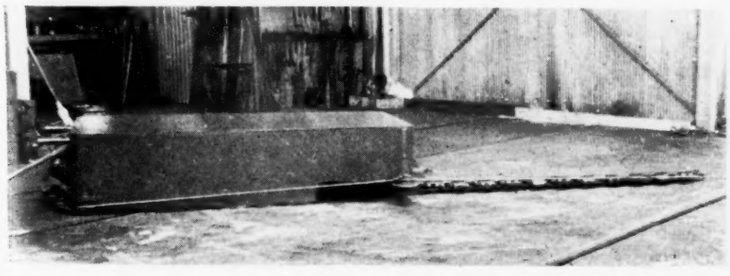
Cutting-machine height for "scooter" mining in thin coal was reduced from 25½ in. to 18½ in. by rebuilding an old Goodman Type 12AA 50-hp. shortwall at the Ansted (W.Va.) shop of the Gauley Mountain Coal Co. In fact, probably it is more accurate to say that a new low-vein cutter was built using principally parts from a 12AA machine. The rebuilt unit is equipped with a 6½-ft. bar of the newer type accommodating a 4-in. kerf cutter chain. As can be seen in the illustrations, the body of the machine is "streamlined" and all controls are on the rear end.

Dimensions of the body are: width, 37¼ in.; length of box proper, 81 in.; and length of body over controls to cutting line, 100 in. Anti-friction bearings are used on the armature shaft (motor), intermediate shaft (counter), vertical shaft (cutter-chain sprocket) and feed shaft (rope drums). Rope speeds are 28 in. per minute for cutting and 42 ft. per minute for the fast feed (flitting).

Cost of building this first cutter was $2,500, not counting the used parts taken from the old machine. Experience to date indicates that the performance will be entirely satisfactory and that the method may be the best solution of the cutting-machine problem that now confronts the management as it works farther into mechanical mining of thinner coal. Scooter mining at Ansted is described in the article beginning on p. 47 of this issue.



Cover plates removed. All controls at rear.



Principally 12AA parts but only 18½ in. high.

Mine-Track Sled 3½ In. High Aids Conveyor Mining

"We couldn't do without it in conveyor mining unless something better came along," remarked Ed. E. Evans, mine foreman, in his description of a material-handling sled used in the new Penman mine of the Beckley Fire Creek Coal Co., Penman, W. Va. The sled is responsible in no small measure for surmounting the difficult and variable conditions which have been encountered in developing the mine.

It consists of a ¼-in. steel plate 53 in. wide by 5 ft. long and reinforced around the edges on the under side and from corner to corner by 1x4-in. irons welded on. Runners, also welded on and spaced for 48-in. track gage, are short sections cut from discarded locomotive tires. When the four runners wear beyond practical limits they are cut off and other pieces from used tires welded in their places.

The top of the sled platform is but 3½ in. above the top of the rail, thus under low top many items of machinery can be conveniently transported which otherwise would have to be taken apart. A bar of 1x4-in. iron 6 ft. long serves as a coupler between sled and locomotive. The two side reinforcing bars extend out beyond the bed plate at each corner and have 1-in. holes to accommodate sheaves or jacks. There is no tendency for the sled to derail and it can be pulled as fast as locomotive speed permits. If pushed, the sled remains on the track equally well.

Sled turned up on edge to show the bottom. Ed. E. Evans, mine foreman, balances it for the photograph.

An open sheave mounted on a flat plate with a loop of chain attached and 30 ft. of ½-in. rope with a link on one end and a hook on the other constitute the auxiliaries that go with the sled. By means of those fittings and two or more steel ties turned upside down to serve as skids, heavy machinery is quickly pulled onto the sled by the locomotive. Loading a shaker conveyor drive by this method is shown in one of the illustrations. In this particular case the sheave is made fast by digging out between two ties, putting the chain loop through underneath the rail from the outside, and sticking a bar through the end of the loop on the inside of the rail. When in use underground, the usual method is to anchor the sheave with a jack tie or timber.

The sled is used for moving the drives of shaker, chain and belt conveyors and the related mining equipment including cutting machines. The list includes mine pumps and even 12x12-in.x24-ft. timbers. To excellent advantage very large pieces of rock have been moved from haulways to gob spaces by skidding them onto the sled and taking them for a ride. Substation equipment such as transformers and converters can be moved on the sled with minimum labor. In all cases of moving equipment, the labor saving is tremendous compared to loading into mine cars. Greater safety is another outstanding advantage.

Locomotive brings the sled, carrying its auxiliaries, to the spot where the shaker drive is to be loaded.

The sheave on the sled has been anchored under the rail, the haul rope attached and the locomotive starts pulling the shaker drive over onto the sled.

•

Force Pump Rigged to Conveyor Takes Care of Water

A force pump ordinarily hand operated was fastened to the pans of a shaker conveyor to solve a water problem in the Ringgold mine of the Ringgold Coal Co., Dora, Pa. According to James R. Thompson, assistant electrician, water in small but regular quantities is encountered in the mine, where a number of Goodman E-II-70 shaker conveyors are recovering the lower Kittanning seam.

"Because of this condition," says Mr. Thompson, "we have often been compelled to install a pump of much greater capacity than actually was needed in order to take care of a small quantity of water very troublesome to work in. Recently, we had a conveyor place that was making a small quantity of water daily. As we had a small hand-operated force pump handy at the time, we pressed it into service instead of installing a regular electric-driven gathering unit. We attached the hand pump to a 2-in. pipe line and securely fastened it to a plank, which in turn was anchored at the working face with posts set from plank to roof. Then, by the use of C clamps and a small piece of iron pipe we fastened the pump to the pans of the shaker conveyor. This produced the backward and forward motion obtained under hand operation.

"This arrangement gave us a small power-operated pump with no noticeable extra consumption of power. When the conveyor was stopped and the place was being cut and prepared, the pump, of course, also was stopped, but when the crew returned to the face to load coal, and the conveyor started, the pump also got going. In this way we have managed to take care of the water problem quite satisfactorily."

•

Combination Gage and Tool Eases Tracklayer's Task

Particularly for use by trackmen working alone, E. C. Hitchcock, electrician, New River Co., Summerlee, W. Va., offers the combination gage and spreader, or puller, shown in the accompanying sketch. When made up to the dimensions and for the gage indicated, the tool can be used to pull track in from 48 to 40 in. or spread it from 36 to 40 in. At the same time, the tool holds the rails in place until they can be spiked by the tracklayer. This considerably simplifies his task when he is working alone on such jobs as replacing rails which have been spread or otherwise displaced as a result of a wreck. Spreading or pulling is accomplished by means of an ordinary track wrench or any other wrench which will fit the 1-in. hex nuts employed. The tool is

No Biting

What a man knows frequently determines whether he can do something constructive when a problem comes up or whether he must stand by biting his nails. One of the best ways of getting knowledge is by personal study and experience. But it is not the only way, as at least one other good one is drawing on the experience of others. This department is conducted to pass on the answers to problems encountered by operating, electrical, mechanical and safety men at the mines. Your help will enable us to do a better job. So send in your ideas on cutting cost, increasing efficiency and promoting safety. For each acceptable idea, Coal Age pays $5 or more on publication.

HAUL DOWN HAULAGE COSTS and UP TONNAGE

with the rugged power of trouble-free, long-lived Exide-Ironclad Batteries

IT'S obvious that as production costs decrease, profits increase . . . and it's just as obvious that if there is a battery depended upon by a great majority of the mining industry to keep production up and haulage costs down, its adoption by you would be a sensible . . . and economical . . . move. There *is* such a battery—Exide-Ironclad. ***More Exide-Ironclads are used in underground haulage than all other batteries combined.***

There are a number of reasons for this overwhelming preference for Exide-Ironclads. One is their high power ability—to handle exceptional loads and grades when necessary. Another is their sustained voltage, delivering faster haulage, greater tonnage per hour and day. Another is their minimum of maintenance cost. Still another is their unusually long life—which further minimizes haulage costs.

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The World's Largest Manufacturers of Storage Batteries for Every Purpose
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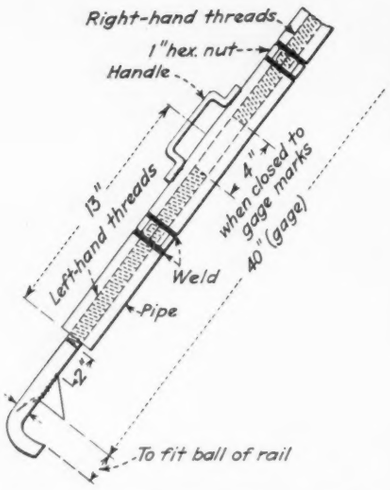


Details of combination track gage and tool for spreading and pulling rails.

easily made, Mr. Hitchcock states, and also may be employed in stretching wire or cables in a pinch.

•

Guards Loading-Machine Motors Against Loose Nuts

When an armature nut comes off the shaft on Joy loading-machine motors, it usually goes through the teeth of the motor pinion and intermediate gear and becomes a major and expensive breakdown, states Thomas James, Knox Consolidated Coal Corporation, Bicknell, Ind. These castellated nuts having a cotter key through the shaft, or double and patented nuts originally furnished, gave considerable trouble, as the usual effect was broken motor feet, a bent motor shaft, and intermediate shaft and broken intermediate shaft bearings—sometimes one of these items and sometimes all, to say nothing of the gear teeth. Fig. 1 shows a front-clutch case of the 5BU Joy loader with front cover and clutch removed, where screen *E*, made out of a piece of ⅜-in. plate, drilled full of holes to allow free grease circulation and fastened to the back of the clutch case with two ⅜-in. capscrews, keeps the motor

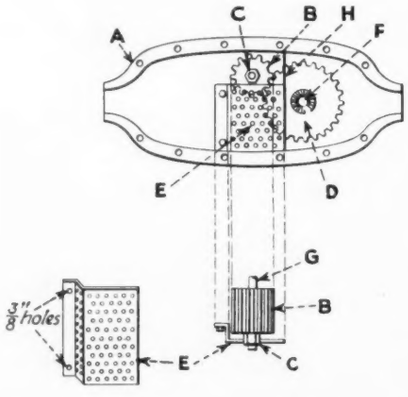


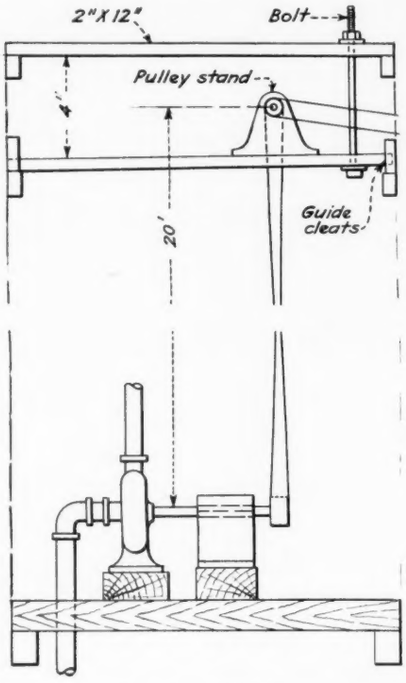
Fig. 1—Front clutch case of 5BU Joy with front cover and clutch removed. *A*, clutch case; *B*, motor pinion; *C*, motor-pinion nut; *D*, intermediate gear; *E*, protecting screen; *F*, intermediate bevel pinion; *G*, motor shaft.

nut out of the gears if it should come off, to result only in the delay of putting it back on again.

•

Bolt and Movable Mounting Ease Tightening of Belt

Mounting the pulley stand on a movable support and using an anchor and bolt is a method of keeping belts tight reported by John May, Fraser, Iowa. This principle was applied to keeping the belt drive tight on a shaft pump, although it has other applications. The pulley stand, as indicated diagrammatically in the accompanying sketch, is mounted on a timber resting loosely on cleats, with auxiliary vertical guide cleats to keep it in line while it is



Showing how belt tightening is accomplished by means of a bolt and movable pulley mount.

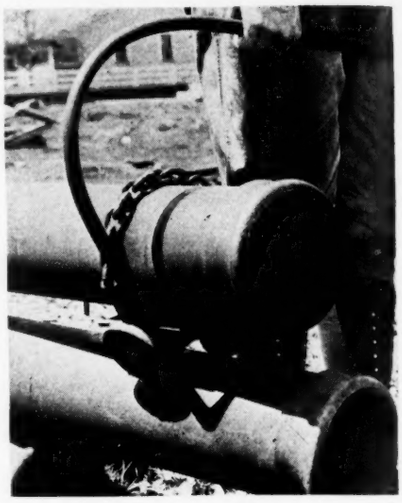
being raised or lowered. About 4 ft. above the pulley mount is another cross member which acts as an anchor for a long bolt which also passes through the mounting member. By tightening up on the bolt, the slack can be taken up in both belts.

•

Handling of Pipe Speeded By Special Wheeled Tool

For moving large-diameter pipe where roads or tracks are not available either for taking pipe in or bringing it out, the tool shown in the accompanying illustration has been designed by W. H. Berguns and built by Zernie Campbell, Cranberry mine, New River Co., Mount Hope, W. Va. Data are supplied by A. C. Bennett, Beckley, W. Va.

The tool consists of a carriage on which two wheels are mounted as shown in the accompanying illustration. The carriage supports the pipe, which is locked in place by the chain. Also attached to the carriage is a curved lifting and moving handle. The



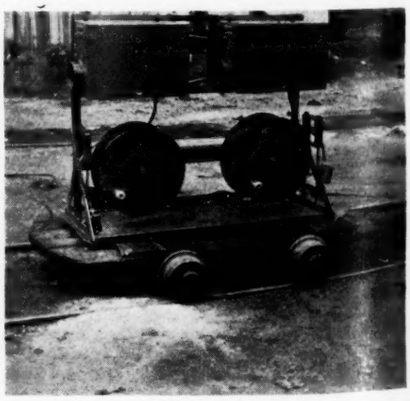
Above, pipe-moving tool showing various parts; below, showing how tool is used.

tools are used in pairs, one at each end of a length of pipe, which is lifted onto the line which already has been laid. Then, using the handle, the pipe is moved along, the wheels on the carriages running on the pipe already in place, which thus becomes a track. "By actual test," says Mr. Bennett, "two men were able to handle more pipe with these tools than twelve men could by carrying."

•

Motor Starter and Cable Reel For Portable Conveyor

In conveyor mining, time and money are saved by constructing a sled mounting to hold a motor starter and conveyor reel to control and supply power to these units, says Ballard Taylor, shop foreman, South-East Coal Co., Seco, Ky. The sled mounting shown in illustration is equipped with 2 O.B. KAD. motor starters and reels, each



Assemble starters and reels on mine truck.

It's thrifty to MORROW-IZE

Yes it's thrifty to Morrow-ize in more ways than one. Morrow service on coal handling and preparation equipment is complete and comprehensive—designing, planning, building—but best of all, the responsibility is all centralized and you have the convenience and saving of *only one negotiation.*

Whether you contemplate a complete tipple installation or modernization of your old equipment Morrow has the answer. Morrow Engineers have considered practically every conceivable coal operation problem and their large selection of standardized designs gives you a broad choice of equipment to meet your exact needs. Why not discuss *your* plans with a Morrow Engineer? Remember it's thrifty to Morrow-ize—one comprehensive service—one responsibility—one negotiation.

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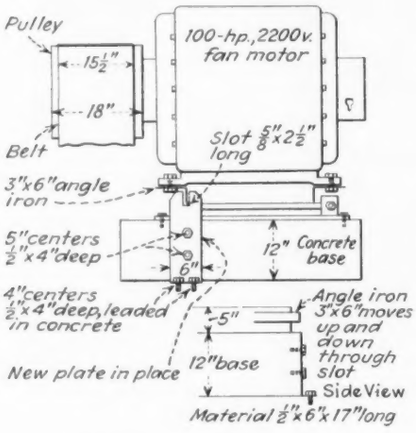
carrying 300 ft. of No. 14 2-conductor cable which is connected to the face conveyors where they are in use and constitutes an easily movable remote-control point.

•

Safety Device for Belt Drives

To prevent belts driving ventilating fans from coming off the motor pulley, John D. Clark, superintendent of Banning No. 1 mine, Pittsburgh Coal Co., Van Meter, Pa., has devised the motor mounting arrangement shown in the accompanying illustration. Sometimes the adjusting screws or



Motor mounting arrangement

bolts regulating or holding belt drive tension break under the motor, which then, being mounted on a rocker arm, swings to one side, causing the belt to fly off the pulley.

The new motor mounting device is made of steel plate ¼x6x17 in. with a slot ⅝ in. wide and 2½ in. deep cut into the top to permit the angle iron which is attached to the bottom frame of the driving motor to work freely in it. This plate is bolted to the foundation; should the adjusting screws on the motor break, the angle iron falls into the slot and prevents the motor from swinging to one side.

•

Requirements for Pipe-Thawing By the Electrical Method

The voltage required for electrical pipe-thawing, states P. C. Ziemke, Milwaukee, Wis., varies with the length and size of the pipe to be heated and also with the material from which it is made. Usually, from 10 to 40 volts is required for average work. The current needed will vary from about 75 to 500 amp.

Either direct or alternating current from a generator or transformer may be passed through the shortest available length of frozen piping that it may be connected to. "Obviously, no specific directions can be given as to the method to employ, since conditions vary greatly. However, if a hydrant is available within 25 to 35 ft. of the building, one connection may be made to it while the other is attached to the street side of the meter, if one is used. Of course, if no hydrant is readily available, this connection may be made to piping on the same common supply in a near-by building.

"Once the points for attachment are determined, the length of pipe involved must be calculated in order to proportion the voltage to be impressed on the circuit. A safe average is to apply 5 volts for line loss and 1 volt for every 7 ft. of pipe in the circuit. Each pipe fitting, if known, must be calculated as equivalent to 1 ft. of pipe because of the relatively high resistance of the threaded joints. The current required for lines of varying diameters and the cross-section of copper wire necessary to impress the proper voltage and amperage on the circuit is given below."

Pipe Size In.	Current Amperes	Wire Gage
¼	75	No. 6
½	125	No. 4
¾	150	No. 2
1	200	1/0
1¼	300	3/0

"Service pipes of ordinary size may be thawed readily by connecting a transformer to the buildings lighting mains, since these as a rule are equipped with 30-amp. fuses. However, some precautions must be taken to see that all electrical ground clamps first are removed, such as those for the radio, telephone and lighting service itself. If connections are made to a sill cock outside the building, check the point of pipe exit in the building wall. Often this hole is larger than the pipe and the void is stuffed with inflammable material, such as paper or rags. Open all convenient faucets to allow the water pressure to be released, as the heating effect of the current turns the ice to hot water and eventually to steam. Under no circumstances allow the water meter, if one is used, to form part of the thawing circuit. If it must remain in place bypass it by securely strapping a conductor of like cross-section as the lea wire around it."

Current Table for 15-Amp. Service

Watts	Pipe Size, in.	Amp.	Volts	Lineal Feet
1,650	¼	75	22	110
1,650	½	125	13	50
1,650	¾	150	11	40
1,650	1	200	8	20
1,650	1¼	300	5.5	None

Current Table for 30-Amp. Service

Watts	Pipe Size, in.	Amp.	Volts	Lineal Feet
3,300	¼	75	44	250
3,300	½	125	26	135
3,300	¾	150	22	110
3,300	1	200	16	75
3,300	1¼	300	11	40

•

Inspection Report Form Keeps Check on Conditions

Detailed checking of bad conditions found in timbering, spragging coal, handling of explosives, and blasting methods used in all active working places is the basis for the inspection report shown in accompanying cut. "Good conditions take care of themselves," says Walter Hornsby, general foreman, Glogora Coal Co., Glo, Ky., who, with his assistant, worked out the inspection form shown, but unsafe practices should be noted and what action has been taken to remove the hazard must be on file at the mine office.

The special inspection service report form is printed in convenient pocket-size pads, and is ruled for quick entry of exact mine locations visited, with emphasis directed to the general safety items noted above. Comments, made on the reverse side of the sheet, are briefly stated facts, together with notation of orders given for their correction.

GLOGORA COAL CO.

SPECIAL INSPECTION SERVICE REPORT

Name of Mine.....

Date.....**19**.....**A. M. P. M.**

I hereby certify that I have this day examined all the active working places in my section of this mine, giving special attention to item numbers 64, 65, 66, 67, 72, 73, 74 and 75 and found all these items standard except in the places noted in the table below. (Make a notation showing what action was taken in each case.)

Signed.....**M. F. Asst. M. F.**

Entry	Room	Ck. No.	64 Entry Timbering	65A Work'g Place Timbering	65B Draw-Slate Timbering	66 Pulling Timbers	67 Spragging Coal	72 Hand'g & Storing Explosives	73 Kind & Amt. of Charge	74 Loading and Firing	75 Method of Firing

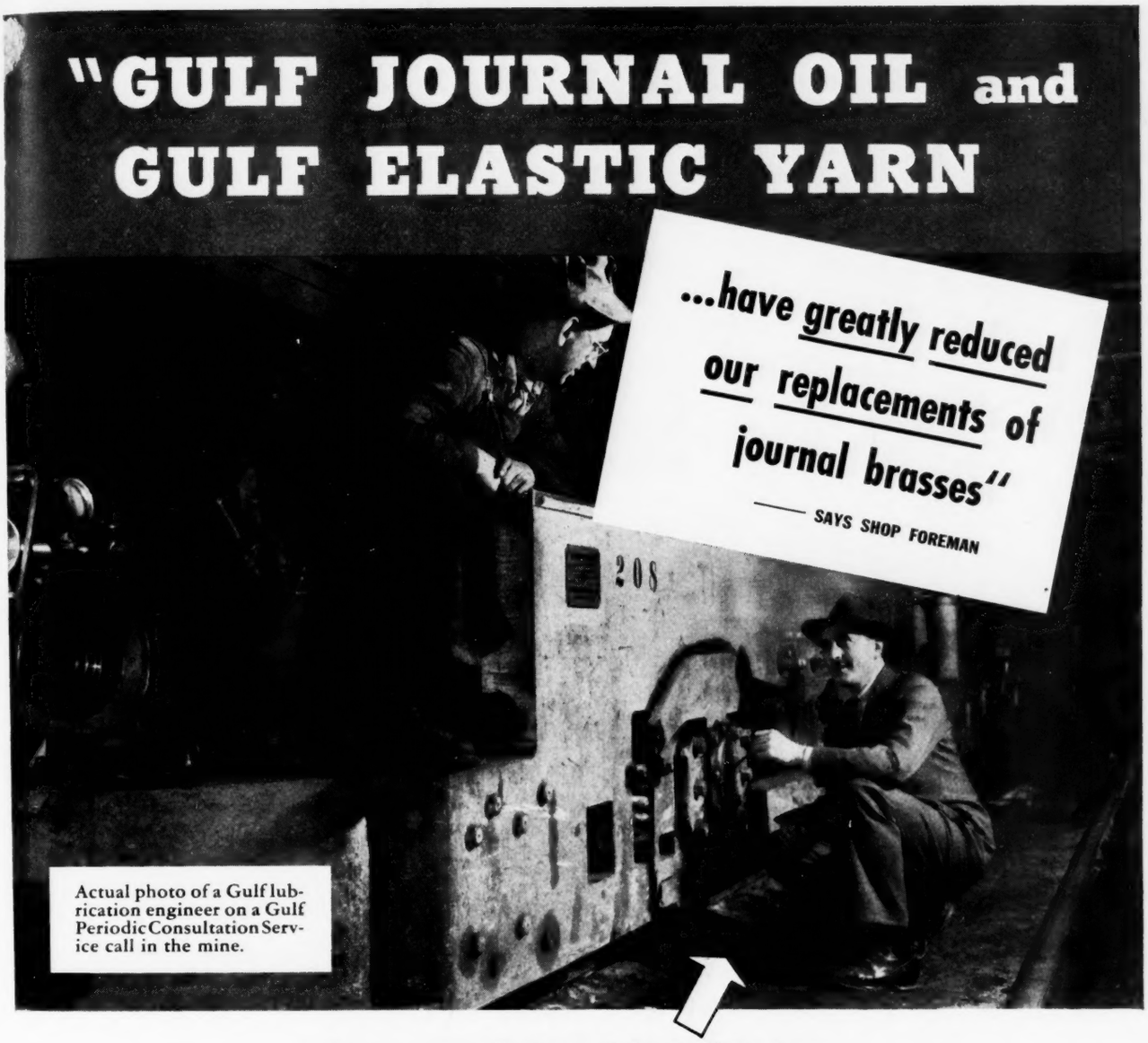
NOTE: The main object and purpose of the above record is to report the bad conditions only, good conditions take care of themselves. Comments should briefly state the facts, that is, what action was taken or orders given to remove the hazard.

This report must be filled out while making inspection and shall be kept on file at the mine office for credit on item 1B.

GENTRY BROS. PRINTING CO. HUNTINGTON (Make Comments on Other Side)

Inspection service form (5x7½ in.)

"GULF JOURNAL OIL and GULF ELASTIC YARN



Actual photo of a Gulf lubrication engineer on a Gulf Periodic Consultation Service call in the mine.

The recommendations of the Gulf Engineer gave us the benefit of extra savings

"THESE two high quality Gulf products have helped us keep our locomotives out of the repair shop," says this Shop Foreman. "And with Gulf Journal Oil and Gulf Elastic Yarn in service our maintenance costs have been very low. By carrying out this Gulf engineer's recommendations, we have enjoyed higher efficiency from our locomotives and increased production!"

If you are looking for means to improve the operation of your equipment and to reduce your maintenance costs, a Gulf lubrication engineer will give you valuable assistance. He will recommend time and money-saving lubricating practice that can be put to work in your mine *at no extra cost!*

Gulf's higher quality oils and greases are quickly available to you through 1100 warehouses in 30 states from Maine to New Mexico. Write or phone your nearest Gulf office today.

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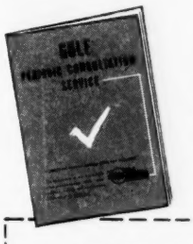

This booklet will suggest to you a practical method by which you can improve production and reduce operating costs. Write for your free copy.

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Company.....

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A typical example of Goodrich development in rubber

HURTLE a big railway car through a tunnel and you're bound to have the roar and clamor and screeching wheels you associate with the subway of today.

But subway officials and car builders weren't willing to quit trying for quiet. They knew of Goodrich rubber springs and other developments that reduce vibration and so reduce noise. They called in Goodrich engineers and set to work.

Every movement of a subway car, every stress and strain that might cause vibration and noise, was studied. Finally a new-type compartment car was designed that literally swings in rubber—the body swings on giant rubber springs, yet there is no sway because rubber absorbs thrust in any direction. Rubber "sandwiches" in wheels keep rail shock from the car trucks and body. Wall panels swing in a rubber base to absorb vibration. In fact rubber eliminates virtually every metal-to-metal contact in body, trucks and mechanism.

The car was tried out, and purred along as silently as an automobile on a boulevard. "Subway nerves" will become a thing of the past.

This is the sort of work Goodrich engineers are doing all the time—finding new ways rubber and synthetics can serve industry as well as improving standard products such as belting, hose, packing, rolls. This constant development work explains why so many users of rubber find that Goodrich products last longer, cost less, serve their purpose better.

The B. F. Goodrich Company, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

(Another story of Goodrich development appears on page 1)

WHAT'S NEW IN THE FIELD

Bituminous Minimum Prices to Take Effect Oct. 1; Compliance Machinery Ready

WASHINGTON, D. C., Aug. 17—With the dispatch of minimum price schedules to the various producers' boards, the issuance of marketing rules and regulations, and announcement that the minimum prices are to become effective on Oct. 1, regulation of the bituminous coal industry under the Guffey-Vinson act at long last is about to go into effect. Director Howard A. Gray of the Bituminous Coal Division, Department of the Interior, started sending out the schedules on July 27 and completed that part of the task one week later.

In announcing on Aug. 12 that marketing rules and regulations had been issued, Secretary of the Interior Harold L. Ickes said that the minimum prices and regulations would take effect on Sept. 3, subject to protests to the Secretary, but postponement was made necessary by delay in finishing hearings on protests, which were expected to last until the end of the month. The price schedules, which fill 1148 pages, set forth the minimum figures below which members of the Bituminous Coal Code may not go in the sale of their coal at the mine. Producers selling below the established minimums risk losing their code membership, which would make them liable to a 19½ per cent tax and possible suit for triple damages by injured code member competitors.

Comparison Now Misleading

Director Gray pointed out that the prices cover substantially all commercial bituminous coal produced from slack to lump and prepared sizes used for domestic heating. Differences in quality and other factors also are reflected, as required by the law. Division marketing officials, however, said that any attempt to compare the minimum prices for specific coals with present market prices for those coals, to reveal whether the minimum prices are higher or lower, would be misleading. Specific information on current prices, it is stated, is difficult to obtain, since mine prices in general have been fluctuating greatly for identical kinds, sizes and grades of coal. The director added that as yet the changes he had made from minimum prices as recommended by division trial examiners had not been tabulated.

The marketing rules prohibit evasions of the minimum prices through such practices as substituting better grades of coal than that ostensibly ordered and paid for by a purchaser. However, subject to approval by the Coal Division, bona fide substitutions may be made by producers to meet temporary situations. When chemical analyses showing the quality of coals are utilized by code members, sales agents or distributors in selling or offering for sale any coal produced by a code member, a report of such analyses must be filed with the Division and the district bituminous coal producers' board. These reports will be subject to inspection at the Division's office in Washington and may be used by the district boards in proposing future minimum prices for the coals of producers filing them.

Although the marketing rules limit agreements for the sale of coal generally to 30 days, subject to further order of the Division, they provide that contracts for periods not exceeding one year may be made with agencies of the Federal or local governments. The rules also provide that contracts exceeding the 30-day limit may be made with special permission or approval of the Division upon a showing of the necessity of meeting long-term competition of oil, gas or other competitive fuels, or for such other reasons as the Division may deem appropriate in order to further the effectual administration of the coal act.

Unfair methods of competition which will constitute violations of the code under the coal act are thus defined:

"The consignment of unordered coal, or the forwarding of coal which has not actually been sold, consigned to the producer or his agent: *Provided*, however, that coal which has not actually been sold may be forwarded, consigned to the producer or his agent at rail or track yards, tidewater ports, or docks beyond such ports, when for application to any of the following classes: bunker coal, coal applicable against existing contracts, coal for storage (other than in railroad cars) by the producer or his agent in rail or track yards or on docks, wharves, or other yards for resale by the producer or his agent.

"The adjustment of claims with purchasers of coal in such manner as to grant secret allowances, secret rebates, or secret concessions or other price discriminations.

"The prepayment of freight charges with intent to or having the effect of granting a discriminatory credit allowance.

"The granting in any form of adjustments, allowances, discounts, credits, or refunds to purchasers or sellers of coal, for the purpose or with the effect of altering retroactively a price previously agreed upon, in such manner as to create price discrimination.

"The predating or postdating of any invoice or contract for the purchase or sale of coal, except to conform to a bona fide agreement for the purchase or sale entered into on the predate.

Rebates in All Forms Barred

"The payment or allowance in any form or by any device of rebates, refunds, credits, or unearned discounts, or the extension to certain purchasers of services or privileges not extended to all purchasers under like terms and conditions, or under similar circumstances.

"The attempt to purchase business or to obtain information concerning a competitor's business by concessions, gifts, or bribes.

"The intentional misrepresentation of any analysis or of analyses, or of sizes, or the intentional making, causing, or permitting to be made, or publishing, of any false, untrue, misleading, or deceptive statement by way of advertising, invoicing, or otherwise concerning the size, quality, character, nature, preparation, or origin of any coal bought, sold, or consigned.

"The unauthorized use, whether in written or in oral form, of trade marks, trade names, slogans, or advertising matter already adopted by a competitor, or any deceptive approximation thereof.

"Inducing or attempting to induce, by any means or device whatsoever, a breach of contract between a competitor and his customer during the term of such contract.

"Splitting or dividing commissions, brokers' fees, or brokerage discounts, or otherwise in any manner directly or indirectly using brokerage commissions or jobbers' arrangements or sales agencies for making discounts, allowances, or rebates, or prices other than those determined under this act, to any industrial consumer or to any retailers, or to others, whether of a like or different class.

"Selling to, or through, any broker, jobber, commission account, or sales agency,

Keeping Step With Coal Demand

Bituminous Coal Stocks

(Thousands of Net Tons)

	July 1 1940	June 1 1940*	July 1 1939
Electric power utilities	10,241	9,789	6,695
Byproduct coke ovens	6,468	5,956	3,548
Steel and rolling mills	580	533	518
Railroads (Class 1)	4,639	4,602	4,484
Other industrials†	12,630	11,514	7,516
Total	34,558	32,403	22,761

Bituminous Coal Production

(Thousands of Net Tons)

	June 1940	May 1940*	June 1939
Electric power utilities	3,832	3,696	3,317
Byproduct coke ovens	6,184	6,000	4,361
Steel and rolling mills	788	751	671
Railroads (Class 1)	6,215	6,534	5,748
Other industrials†	8,077	7,950	6,690
Total	25,096	25,741	21,521

* Revised. † Includes beehive ovens, coal-gas retorts and cement mills.

which is in fact or in effect an agency or an instrumentality of a retailer or an industrial consumer or of an organization of retailers or industrial consumers, whereby they or any of them secure either directly or indirectly a discount, dividend, allowance, or rebates, or a price other than that determined in the manner prescribed by this act.

"Employing any person or appointing any sales agent, at a compensation obviously disproportionate to the ordinary value of the service or services rendered, and whose employment or appointment is made with the primary intention and purpose of securing preferment with a purchaser or purchasers of coal."

Conforming to a request by Director Gray for suggestions on a program to assure compliance with the minimum prices and marketing regulations the Bituminous Coal Producers Boards Conference Committee named a group of representatives which met with officers of the Coal Division on July 24 for the purpose. The coal industry representatives included: Ezra Van Horn, chairman, District 4 Producers' Board (Ohio); J. R. Henderson, secretary, District 10 Producers' Board (Illinois); Walter A. Jones, secretary, District 1 Producers' Board (central Pennsylvania and parts of Maryland and West Virginia); J. Norval Terrio, secretary, District 6 Producers' Board (West Virginia Panhandle); and A. L. Vogl, counsel for District 16 Producers' Board (western and southern Colorado).

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Mine Inspection Bill Rejected

The Neely-Keller mine inspection bill (S. 2420) is dead—at least for this session of Congress. Its rejection came about on the issue of whether the House Mines and Mining Committee should report the measure back to the House for consideration. Rejection was by a tie vote of 9 to 9, failure to vote the bill out of the committee being tantamount in parliamentary procedure to killing it for the session. Following the committee vote, Representative Keller, cosponsor of the bill, presented to the Speaker a petition to take the matter out of the hands of the committee and give it the right of way in the House, a step which will require at least 218 signatures.

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Shavers Mountain Co. Formed

L. Wade Coberly, of Elkins, W. Va., in association with Chester C. Housh, Elkton, Va., and George L. Oliver, Washington, D. C., has organized the Shavers Mountain Coal Co., capitalized at $10,000 to operate on Shavers Mountain, near Elkins. The mine is to be located between Roosevelt Park and Bickels Knob on a tract of 86 acres leased from the Cunningham Land Co. General offices of the company will be in Elkins with Mr. Coberly as general manager and Joe Savage, of Bemis, mine superintendent.

Development work preparatory to opening the mine was begun about the middle of August, including the construction of a tipple and other necessary appurtenances. The company plans to market its coal—from the Sewell seam—both locally and in Virginia, shipping by truck.

Coming Meetings

• Twenty-ninth National Safety Congress: Oct. 7-11, Stevens Hotel, Chicago.

• Fourth Annual West Virginia Coal Conference, sponsored by West Virginia University and West Virginia Coal Mining Institute: Oct. 18 and 19, West Virginia University, Morgantown, W. Va.; joint sessions to be held with West Virginia Society of Professional Engineers, meeting Oct. 17-19 at Hotel Morgan.

• Illinois Mining Institute: Forty-eighth annual meeting, Oct. 25, Hotel Abraham Lincoln, Springfield, Ill.

• Coal Division, American Institute of Mining and Metallurgical Engineers: fall meeting, held jointly with Fuels Division of American Society of Mechanical Engineers, Nov. 7-9, Birmingham, Ala.

Personal Notes

D. J. Carroll has returned to Beckley, W. Va., as general manager of the Crab Orchard Improvement Co. For the last fourteen years he has been connected with the Continental Coal Co.

Thomas N. Chalmers, vice-president, Tennessee Coal, Iron & Railroad Co., has been appointed chairman for the industrial division of the Birmingham and Jefferson County (Ala.) community chest in its eighteenth annual appeal.

R. D. Chamberlain, vice-president in charge of production and sales for the Bair-Collins Co., Roundup, Mont., has retired from active service with the company because of ill health.

G. E. Gildroy has been promoted from mine superintendent to vice-president in charge of production and sales by the Bair-Collins Co., Roundup, Mont., vice R. D. Chamberlain, retired.

Dean D. A. Potter of the School of Engineering, Purdue University, Lafayette, Ind., has been awarded the Lamme medal for "promotion of engineering education." Dean Potter has cooperated with Applachian Coals, Inc., and is well known to the coal and mechanical burning equipment industries.

Ben H. Purser has been appointed superintendent of the Alabama By-Products Corporation's Praco mine, Praco, Ala. Identified with Alabama mining in the past, Mr. Purser has been connected with operations of the Consolidation Coal Co. in West Virginia and Kentucky for the last fourteen years. He succeeds John W. Hagar, resigned.

J. A. Saxe, formerly division engineer of the Ellsworth division of the Industrial Collieries Corporation, Ellsworth, Pa., has been appointed chief engineer by the Island Creek Coal Co., Holden, W. Va.

Frederick Grant St. Clair, chief engineer in charge of power plants at Washington University, has been reappointed a member of the appeal board of the City Smoke Division of St. Louis by Mayor Dickmann.

Stoker Manufacturers Publish Business Standards Code

A code of standard business practice approved and adopted at its recent annual meeting has been released by the Stoker Manufacturers' Association. The code, which involves standards covering consumer and trade-paper advertising for the small stoker industry, represents the work of a special committee extending over nearly a year. The committee, headed by C. T. Burg, general sales manager, Iron Fireman Mfg. Co., includes C. E. Lewis, sales manager, Delco Appliance Division, General Motors Corporation; A. D. Scoville, general manager, Cotta Transmission Corporation, and Stevens H. Hammond, vice-president, Whiting Corporation.

In addition to promulgating advertising standards the code recommends adoption of a standard accounting practice manual for dealers "to assist the retail stoker industry in determining essential items of cost and as a guide for dealers in establishing sound and practical methods of cost accounting for the retail stoker business." In this connection, a special committee composed of the chief stoker auditors of three member companies of the association have been delegated to study accounting practices of retail stoker dealers and to report to the association as soon as possible with its recommendations as to a simplified accounting practice manual which can be easily adopted and put into effect.

The code also established a standard warranty on stokers and stoker parts as well as a standard service guarantee. The standards are available in printed form free of charge from the association, 307 North Michigan Ave., Chicago.

Adoption of Code Urged

Believing these standards to be a constructive as well as necessary step in an effort to stabilize and improve business practices and conditions in the industry, officials of the association urge adoption of the standards by all manufacturers as well as distributors and dealers. Consumer advertising standards established in the code are:

"In so far as consumer advertising is concerned it is recommended that all advertising in consumer mediums and in consumer literature on the merits and claims of stokers eliminate reference and statements to the effect that stokers will *eliminate* smoke, soot and ashes. It is entirely proper to state that the stoker will *abate* and *reduce* smoke and that the use of stokers will avoid violation of smoke ordinances. It is recommended that reference to soot and ashes be eliminated entirely from advertising copy and that conservative advertising statements be used by referring to clinkers and clinker removal.

"That conservatism by practice in making claims of savings that stokers will provide, particularly in the residential size machines; that it is proper to compare savings made with stoker-fired coal over oil or gas wherever or whenever lower prices on coal are available. (This is considered of particular importance because of the fact that the price of household-size stoker coal is gradually increasing and in many places and important markets the price of prepared sized stoker coals is higher or equal

HAZACORD

All-Rubber Cords and Cables for MINING OPERATIONS

For Electric Drills

(and all other portable electric tools):

Hazacord provides the rugged strength to withstand dragging over rough ground, trampling and other inevitable abuses. The 60% rubber jacket is tough, dense and elastic.

For Electric Mine Locomotives

Hazacord Reel Cable with its small diameter, smooth, tough rubber jacket and extra flexible conductor is being used (millions of feet) wherever gruelling conditions demand the best.

For Electric Shovels

(on stripping operations):

Hazacord Shovel Cable's dense all-rubber jacket defies abrasion from sharp rocks and stands up under terrific punishment. The separate conductors are adequately insulated for the required voltage and bonded together with the sheath into an integral unit.

HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE CO.

WORKS: WILKES-BARRE, PENNSYLVANIA

New York Chicago Philadelphia Atlanta Dallas Washington Cleveland

Pittsburgh Buffalo Boston Detroit Seattle San Francisco St. Louis Los Angeles

to the price of hand-fired sizes of coal or coke. The committee recognizes the fact that there has been much less of this type of advertising during the past year, but it is still being used in certain districts where such claims can be seriously questioned.)

"Advertising is unwise that claims stokers will burn any and all coals with equal efficiency or ease of operation or performance. Such claims cannot be substantiated and only lead to criticism for all connected with the stoker industry.

"Advertising to consumers of savings possible with stokers is proper within the limits prescribed under item (b); it is preferable to advertise the advantages of better heat and more comfortable heat and home living conditions derived from stoker firing. In other words, that the advertising emphasis be placed on the comfort and convenience of stoker firing rather than the emphasis on savings.

"Every member of the association and every stoker manufacturer should represent his products truthfully and eliminate unqualified adjectives and phraseology. The use and abuse of superlatives in consumer advertising is an inducement to the customer and prompts him to expect too much of what stokers will actually do.

"The committee urges modification in the industry's use of the word 'automatic' and elimination of the phrase 'fully automatic' in view of the fact only the bin-feed ash-removal type anthracite burner could in any way be considered a fully automatic coal burner. The use of the phrase 'no attention' should be eliminated and the word 'attention' should be used wisely with reference to the amount of time and attention a stoker fire requires for successful and satisfactory operation. State frankly that the hopper-type stoker requires filling by hand and that clinkers in the bituminous burner must be removed at necessary intervals."

Advertising Standards Set Up

The standards covering advertising in trade papers are as follows:

"When and if price advertising is used in trade magazines the *installed retail price* be entirely eliminated. When and if price advertising is used in trade journals, the *f.o.b. factory list price be the standard.* False and misleading statements frequently made that unusually low and cut retail installed prices on stokers still provide regular and ample margins for dealers and distributors and should be eliminated in all trade-paper advertising.

"No misrepresentation of company product or performance of the product.

"Elimination of untrue claims made as to the size or age of the company and elimination of 'glorified' pictures showing stoker manufacturing plants of unusual size when a stoker end of the business is only part of the total of the plant and property involved.

"Elimination of all statements in trade-paper advertising as to misleading and unqualified claims made by manufacturers as to services and factory assistance provided to dealers and distributors."

The standard warranty covering stokers, stoker parts and service is as follows:

"Each manufacturer will publish wherever practical in catalogs, contracts, price sheets, and literature distributed to dealers and distributors, the standard warranty adopted by the Stoker Manufacturers' Association in June, 1938. This warranty is as follows:

"*Standard Warranty on Stoker and Parts.*—The manufacturer guarantees the stoker to be free from defective workmanship and material for one year from date of installation: parts found to be defective by the manufacturer will be replaced or repaired under this guarantee without charge f.o.b. factory, misuse and abuse excepted; parts exposed to the fire not covered under this warranty.

"*Servicing Guarantee*—The seller agrees to service the stoker covered by this contract without charge for a period of 90 days after installation, or in case of installation of heating plants made during the summer months, free-service period will begin Oct. 1."

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J. D. A. Morrow

Alabama Court Reverses Ruling On Suspension Benefits

Fifteen thousand coal miners are not entitled to collect unemployment compensation for idleness between March 31 and May 19, 1939, the Alabama Court of Appeals ruled in a test case on Aug. 6. The ruling reversed a decision of the lower court and was in favor of the Tennessee Coal, Iron & Railroad Co., largest employer in the Birmingham district.

Under the State's unemployment compensation act, employees are not eligible for benefits (which range to a maximum of $15 weekly) when the idleness is "directly due to a labor dispute." The appellate court said: "The naked fact is that appellee (Rufus Pesnell) quit work during the time his agents were discussing the terms of a proposed contract with the management. The terms were a matter of controversy. Appellee was out of work because he was a party to a controversy over wages, hours and conditions of labor. That is a labor dispute."

Operators refused during this period to operate on "a work pending agreement," with any pay raises, hour cuts or changed working conditions in the Appalachian field to be retroactive in Alabama to March 31, and union executives declined to permit any men to work without this stipulation

Four Consolidation Teams Head First-Aid Contestants

Consolidation Coal Co. teams captured the first four places in the ninth annual safety day contest of the Central West Virginia Coal Mining Institute, held July 20 at Jackson's Mill, W. Va. Dr. Charles E. Lawall, president of West Virginia University, was master of ceremonies; Dr. A. L. Murray, surgeon, Pittsburgh (Pa.) Experiment Station, U. S. Bureau of Mines, officiated as chief judge, and about eight thousand people were in attendance.

The struggle for first place was keenly contested, four extra problems being necessary before Team No. 30 from Owings mine No. 32, captained by Victor Null, came out on top with a perfect score. Second place went to Team No. 29, Owings, with 3,498 points out of a possible 3,500; third, Team No. 20, Carolina mine; fourth, Team No. 9, Central Repair Shop, Monongah; fifth, Team No. 12, Koppers Coal Co., Grant Town. In the colored division, first honors were taken by Team No. 33, Koppers Coal Co., Grant Town. In the junior division, Team No. 39, Owings Boy Scouts, was first.

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Morrow Heads Joy Mfg. Co.

J. D. A. Morrow resigned from the presidency of the Pittsburgh Coal Co. on Aug. 7, effective as of Aug. 31. This action was taken so that he could accept the presidency of the Joy Manufacturing Co., Franklin, Pa., manufacturer of mobile coal-loading equipment. In the latter capacity he will succeed W. E. Barrow, who has been elected chairman of the board.

Mr. Morrow will continue on the board and executive committee of Pittsburgh Coal, with which he has been associated since 1926. He helped found the Joy company, has been one of its directors for years, and was formerly vice-president and general manager.

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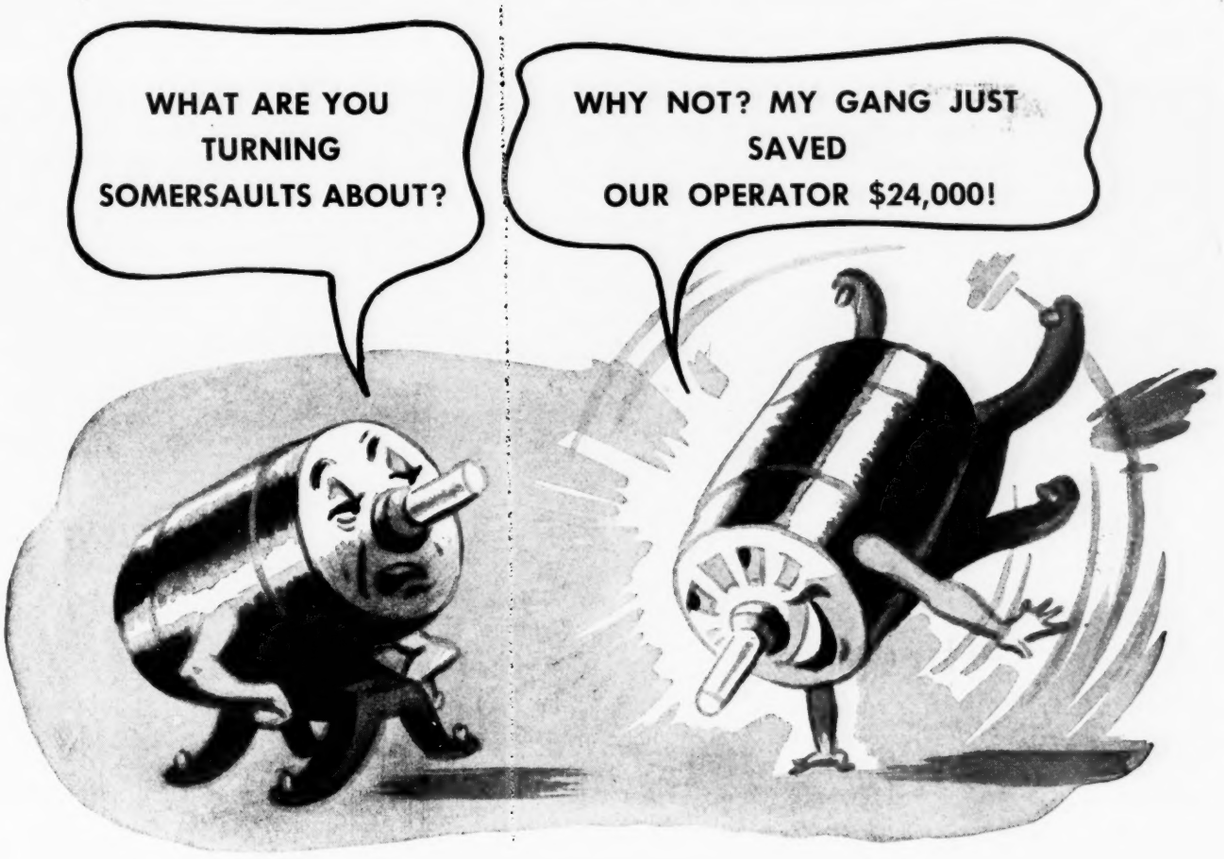
L.N.C.C. Offers Scholarships

Two college scholarships to encourage young men of the Panther Creek Valley, Pennsylvania, to fit themselves for positions of a supervisory character are to be awarded by the Lehigh Navigation Coal Co., Inc., this year, it was announced late in July by J. B. Warriner, president of the company. The scholarships, valued at $400 each, are open to employees of the company and to recent high school graduates in the valley. In addition, vacation employment is to be given the scholarship holders, and jobs with the company will be available to them upon completion of their college course.

The scholarships are for study in any of the available mining schools, including Lehigh, Pennsylvania State College, Lafayette, Columbia or the University of Pittsburgh. The awards will be made by a committee composed of company executives and a representative of the United Mine Workers, selection of recipients being based on scholarship, aptitude test results, work experience, and general all-round character and ability.

"The scholarship awards," said Mr. Warriner, "grow out of the company's need for

(Turn to page 82)



Insulating Your Electrical Equipment With Fiberglas* May Make Comparable Savings

IN 1938 a certain steel company (name on request) spent $39,000 for electrical maintenance. The figures are theirs, not ours.

In 1939 they standardized on Fiberglas Electrical Insulation for motor repairs. At the year-end this maintenance cost TOTALLED $15,000.

That's twenty-four thousand dollars less.

But that's not all . . .

They kept the extra $24,000 in the bank in spite of running *more* equipment *more* hours than the preceeding year.

Their equipment worked successfully in moisture . . .

. . . in scorching heat, dust, flying scale-particles from the rolling mills . . .

. . . over pickling baths where corrosive acid fumes surround the motors . . .

. . . and on cranes where many stops and starts caused serious overloads . . .

And in all cases Fiberglas did a better insulating job. Cut down failures from overwork in the toughest spots.

*What Is Fiberglas?**

It's glass in fibrous form, made by Owens-Corning Fiberglas Corporation. It is fabricated into tapes, braids and

tying cords. It is served to magnet wire. It is combined with mica, plastics, or varnishes to make slot insulation, laminated materials and varnished cambric and tubing. In short, it is available in any form necessary for electrical insulation.

Thin but efficient, it has permitted the saving of weight and size of motors without cutting down their horsepower when desirable.

Remember, it's glass.

Moisture doesn't harm it. And it resists most chemical corrosion better than *any other* insulation in ordinary industrial use. The *only* acid that attacks it is H_2F_2.

Who Uses Fiberglas?

Smart engineers everywhere, whose responsibility is electrical maintenance!

But don't take our word for it. Here's what you do . . .

Next time you have a new installation or a repair job for a unit in really tough service—specify complete Fiberglas Electrical Insulation. When you do, you, too, may save a lot of headaches, "down time," and hard cash. For complete data on this new electrical insulation, write Owens-Corning Fiberglas, Toledo, Ohio. In Canada: Fiberglas Canada, Limited, Oshawa, Ontario.

OWENS-CORNING

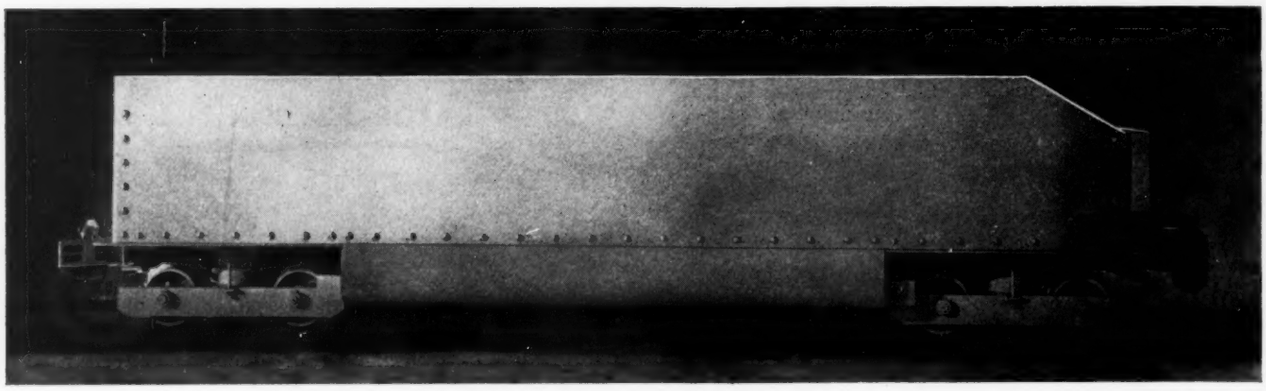
FIBERGLAS*

*T. M. Reg. U.S. Pat. Off.

TOLEDO, OHIO

SPECIFY FIBERGLAS ELECTRICAL INSULATION

DIFFERENTIAL STEEL CAR COMPANY, FINDLAY, OHIO



CUT COSTS WITH DIFFERENTIAL

8-Wheel AXLESS Trucks MINE CARS Large Capacity

Differential Cars increase capacity of loading machine (see graph below).

Differential Cars reduce initial investment because fewer cars are needed to equip a mine.

Differential Cars reduce compensation claims. High degree of roadability restricts derailments and reduces accidents.

Differential Cars reduce maintenance cost. There are fewer cars to maintain and the major maintenance caused by derailment is avoided on account of the roadability of the AXLESS truck.

Differential Cars reduce road-cleaning costs because the cars are tight and, furthermore, ride the track smoothly at high speeds without shaking off the topping.

Differential Cars save in track maintenance because wheel loadings are reduced, wheel loadings are equalized, and the AXLESS truck negotiates curves without wheel flanges crowding the rail.

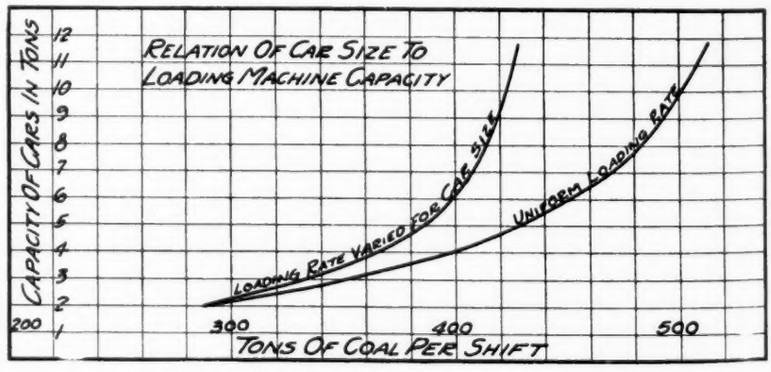
Differential Cars save power. Rolling friction reduced on both curves and tangents. Favorable live load ratio saves appreciably on power.

Differential Cars reduce wheel wear. Wheel flanges do not crowd rail. No wheel slippage on curves.

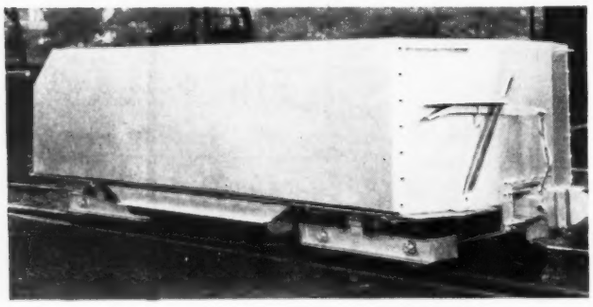
Differential Cars permit greater capacity within given clearance limitation. 8-Wheel design allows for proper balancing and maximum body size with simple construction.

Higher safe speeds of Differential Cars cut costs because fewer cars are needed and fewer locomotives.

The graph on the right illustrates how increasing car size will increase capacity of loading machine and therefore reduce the cost per ton of coal. This graph was developed under actual conditions and a different set of mining conditions might not give this result but the relation between mine car size and tons per shift would remain closely proportional.



WRITE FOR BULLETIN D-51

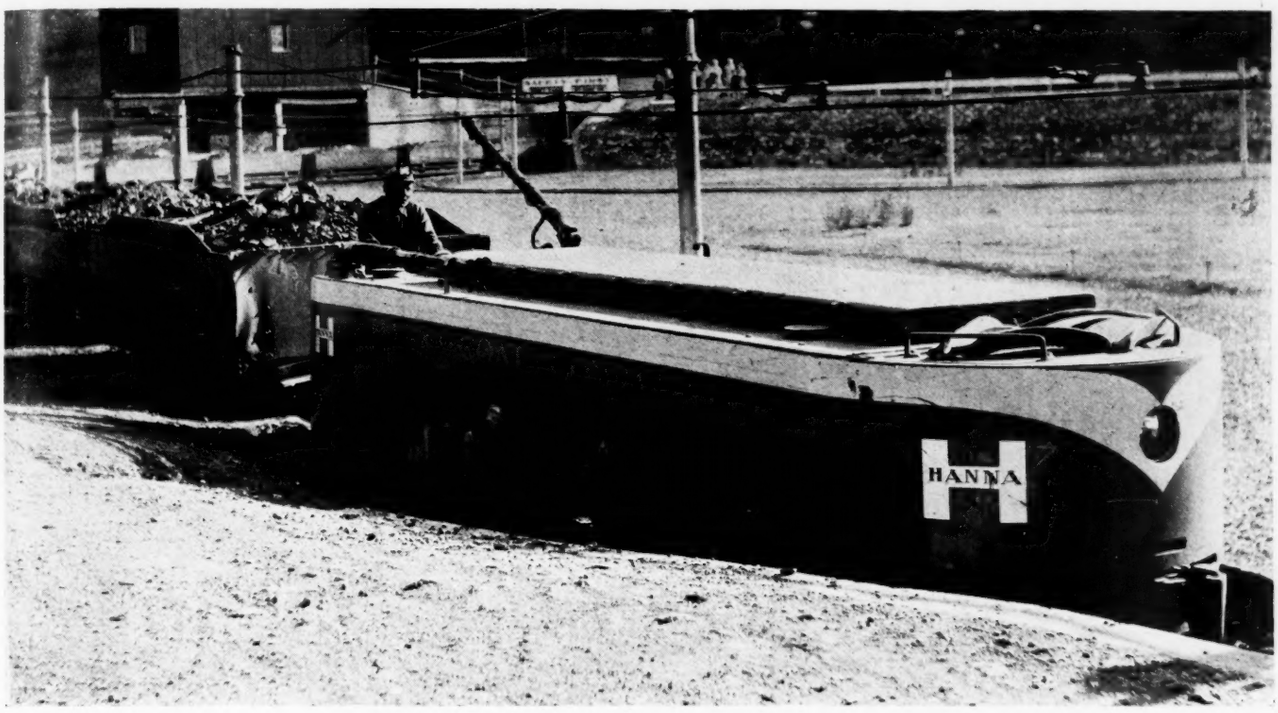


DIFFERENTIAL CAR WORKS

FINDLAY, OHIO

Builders of Haulage Equipment since 1915

Mine Locomotives Mine Cars Dumping Devices 3-Way Dump Larry Cars
Burden-bearing Locomotives Haulage Equipment for Strip Mines
Stock-piling Cars Complete Haulage Systems



CUT COSTS WITH DIFFERENTIAL

8-Wheels MINE LOCOMOTIVES Axless Trucks

Increased drawbar pull. No wheel slippage on curves to break down adhesion and cause loss of traction.

Higher speeds. More coal moved per locomotive per shift.

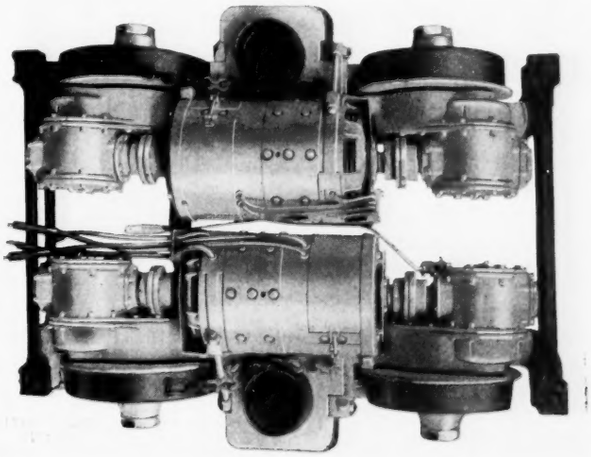
Safety. High degree of roadability even on rough track, less chance for derailment and accident.

Reduced maintenance. Gears mounted on anti-friction bearings which insure their being held in proper mesh. Gears and wheel bearings float in bath of oil.

Availability. Design and construction such that high availability is insured keeping locomotive on the job instead of in the shop.

Reduced track maintenance. Differential AXLESS trucks not only decrease wheel loading but also equalize it. The swivel and oscillating action of these trucks, together with the long springs put less strain on the track.

A Differential AXLESS Locomotive has at the present time completed over 1000 shifts (on 3-shift per day operation) for a total of 40,000 miles without tire turning or change and has been available for service 99-½% of the time.



WRITE FOR BULLETIN D-47

DIFFERENTIAL CAR WORKS

FINDLAY, OHIO

Builders of Haulage Equipment since 1915

Mine Locomotives Mine Cars Dumping Devices 3-Way Dump Larry Cars Burden-bearing Locomotives Haulage Equipment for Strip Mines Stock-piling Cars Complete Haulage Systems

A Laughlin drop forged Safety Clip takes hold of wire rope with a sure, solid grip — just like a fist. It's no rope crimping "finger pinch," but a rugged vise-like hold. Tests have proved Laughlin Safety Clips twice as efficient as ordinary "finger pinch" U-Bolt clips.

SAVES WIRE ROPE. There's no bowing or distortion of wire strands in rope secured with Laughlin Safety Clips. So — no wire has to be discarded after Safety Clips are removed — with a resultant saving to you.

FASTER TO APPLY. Laughlin Safety Clip nuts are on opposite sides — easy to get at. Two wrenches can be used at once — you save lots of time clipping rope this *modern* way.

Write for free booklet describing many money-saving features of Laughlin safety clips. Also gives results of recent tests by a great engineering school, proving Laughlin Safety Clips 50% more efficient. Fill out coupon — today.

THE THOMAS LAUGHLIN CO.
Portland, Maine C-6

Please send me free Safety Clip booklet.

Name .....

Company .....

Address .....

Check here for catalog on items below ☐
Look for Laughlin products in COAL MINING CATALOGS and buy through your distributor.

additional technically trained young men for various departments, especially mining. In planning this move, consideration has been given to our own employees and residents of this region. The company believes that young men brought up in the Panther Creek Valley and familiar with conditions there are more likely to profit from technical education and to become good mining men. We hope to develop men who will be available for key positions in the company in future years."

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Consolidated No. 7 Dismantled After Picturesque Career

By Fred W. Richart

July 20, 1940, was blue letter day for Mine No. 7, Consolidated Coal Co., Herrin, Ill. That day ended almost 44 years of high-geared coal production in the best of the Illinois coal fields. This mine led the way in the series of big coal developments of Egypt that culminated with the New Orient mine.

No. 7 was put in production in the summer of 1896 by Big Muddy Coal & Iron Co., of which Ethan A. Hitchcock was the active head. William McKinley was elected President of the United States that fall on the slogan, "A full dinner pail." Mr. Hitchcock became Secretary of the Interior in McKinley's cabinet in 1898.

The mine was designed for a 1,500-ton output in a 10-hour day. But it was asked to do more. It lived up to the ideal of many mining men, that mine equipment should rate double intended capacity, for it produced 2,500 tons in 8 hours without change in structures—only added power.

No. 7 also led the way in split-timber construction in Egypt and was followed by many imitators. There was but one square timber tipple built in the field after that. It had the first self-dumping cages, the first weigh basket with self-closing doors and the first shaking screen in the field. The shaking-screen idea was brought from Indiana by Hiram Willson, superintendent, brother of Governor Willson of Kentucky. The driving rods for the shaking screen had spring connections to absorb the shock of reversal, but few modern designers have cashed in on this common-sense idea.

A Campbell coal washery was included with the original plant, which handled minus 1¼-in. coal. This was the second washery in this coal field and, while it was dubbed a "wetter" by the mine workers, did a creditable job for a plant that cost so very little. The Missouri pine lumber cost, perhaps, $10 per M ft.; the whole elevator and conveyor equipment, shafting and rope drive, $2,400, from Link-Belt. The patent easements cost $250 per table for the washing tables. Five were built in the mine shop. The labor contract for erection of the timber structure (ex foundations and machinery) was $400. These figures are from memory, but they are exact or very close.

The original engine room, shop and office, with additions, still stands. The tipple burned and was replaced with steel. The washery was replaced with a rescreening plant arranged for hand picking. Most of these changes were made by the present owner, Consolidated Coal Co., which bought the property about 1920, and under the direction of W. J. Jenkins, president.

Among the old timers who figured importantly in the operation of No. 7 were the late P. H. Carroll, who later became general superintendent for Taylor Coal Co., and Garner Williams, now vice-president of Cabin Creek Consolidated Coal Co. No. 7 used the second lady miner in Williamson County, Mrs. Gussie Newkirk, who ran the mine office throughout the entire original ownership.

Except for the boiler and turbine generating plants, which will continue to supply power to the Buckhorn mine, and the office, the mine will be dismantled. The

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The author of this farewell to a famous mine was also the designer of the original plant. "I also," said Mr. Richart, "laid off and scratched every stick of timber that went into it and supervised all the top construction and did the mine surveying for a good many years." Following several years of such work, the author joined the staff of General Electric Co., from which he retired in 1939. Mr. Richart is now special editorial field representative for *Coal Age* in southern Illinois.—EDITOR.

To Break Ground Soon for Mineral Industries Building

Construction of West Virginia University's Mineral Industries Building is to get under way this month, plans and specifications having been completed. The six-story structure will cover a ground area 310x72 ft. and will house not only the School of Mines but also the chemical engineering department, department of geology, and State Geological Survey. According to President Charles E. Lawall and D. L. McElroy, director of the School of Mines, it is hoped that the structure will be ready for use at the opening of the 1941–42 term.

Leading cigarette manufacturers meet consumer demand with the SEALED PROTECTION of cellophane . . .

MINE OPERATORS VOTED

9 to 1 the demand is increasing for dust-proofed fuel!

. . . and Leading Operators are Answering the Demand with

COALKOTE'S SEALED PROTECTION

PROTECTS CONSUMER . . . PRODUCES SALES

Consumer demand today is for cleanliness! Whether it be cellophane wrapped cigarettes or dust-proofed fuel—the product that assures cleanliness to the consumer wins sales acceptance!

Here's proof. A survey by Coal Age of mine operators in 140 companies, controlling 400 mines, revealed that 90.3% recognize the increased demand for dust-proofed fuel.

Prepare now to cash-in on this demand . . . dust-proof your fuel with COALKOTE's "Sealed Protection." Its long-lasting film effectively seals dust to the larger pieces of fuel . . . assures cleanliness . . . prevents slacking . . . and helps step-up sales. Your SUN Technical Representative has all the facts. Write . . .

SUN OIL COMPANY, Philadelphia, Pa.

Sponsors of the Sunoco News Voice of the Air — Lowell Thomas

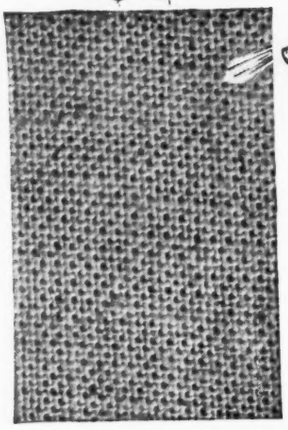
SUN OILS

"COALKOTE"

THE MODERN METHOD TO DUST-PROOF FUEL

Moropa

COTTON BRATTICE CLOTH
OFFERS HIGH RESISTANCE
TO *FLAME • ROT • FUNGUS*
MILDEW • AIR LOSS
ABRASION



Don't risk the loss of life, valuable property and profitable operation—choose a brattice cloth that's definitely known to have the highest qualities for resisting fire, friction, fungus, mildew and acid water—MOROPA. Tested in laboratory and field, MOROPA has proven beyond doubt that it will outlast ordinary brattice cloth 2 to 4 times. Of one grade and one quality, MOROPA is carried in standard stock widths of 36", 48", 60", 72" and 84" . . . always in sufficient quantity to assure prompt deliveries. For complete descriptive details, write to us. We have special sizes for your special needs.

JOHN FLOCKER & COMPANY

ESTABLISHED 1822

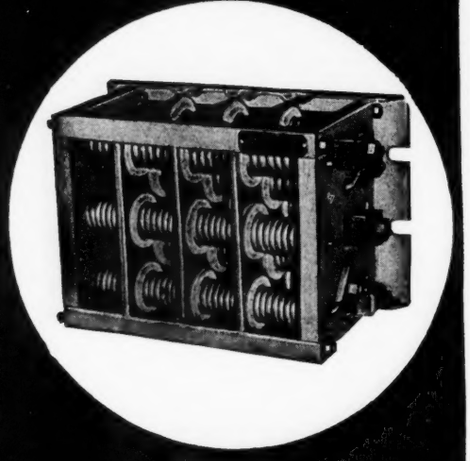
644 GRANT ST. PITTSBURGH, PENNA.

Not Resistance TO Profits . . . but

RESISTANCE FOR PROFITS

Equip your locomotives and mining machines with **G.M.C. RESISTANCE UNITS!**

Built to carry heavy overloads, these G.M.C. Resistance Units start smoothly, accelerate properly, and withstand heavy abuse. They allow free circulation. G.M.C. Resistance is made to fit any type of locomotive or mining machine. Let us tell you more about it!



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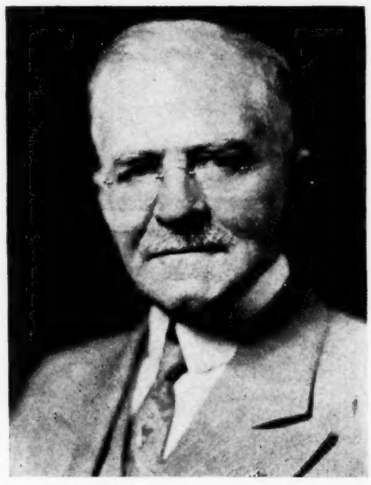
FOR THE LATEST G. M. C. BULLETINS

GUYAN MACHINERY COMPANY
LOGAN • • • WEST VIRGINIA



James F. Callbreath

rescreening plant will be removed to the Buckhorn mine, where it will be put in service again. Buckhorn is about two miles from No. 7 and has coal for several years' operation.

•

J. F. Callbreath Is Dead

James F. Callbreath, 81, secretary emeritus of the American Mining Congress, died Aug. 4 at Alamosa, Colo. Born in Sullivan County, New York, Mr. Callbreath taught schools and edited the Sullivan County *Republican* for a while. He moved to Denver in 1894, and received a law degree from the University of Denver the following year. From 1894 to 1901 he edited the *Mining Reporter*, three years later becoming secretary of the American Mining Congress, which office he held for 30 years, retiring in 1934.

•

New Preparation Facilities

CARTER COAL CO., Mine No. 5, Juno, W. Va.: Contract placed with Fuel Process Co. for one washer to clean 50 tons per hour of 3x1¼-in. stove coal; to be completed about Sept. 9.

CLOVER FORK COAL CO., Kitts, Ky.: Contract placed with Morrow Mfg. Co. for crushing and rescreening plant, equipment consisting of conveyors, crusher, vibrating screens, steel structure and housing; capacity, 200 tons per hour of 0x6-in. coal.

CRAB ORCHARD IMPROVEMENT CO., Mine No. 6, Eccles, W. Va.: Contract placed with Fuel Process Co. for one coal washer to clean 40 tons per hour of 2x⅝-in. stove and one washer to clean 40 tons per hour of 7x2-in. egg coal; completed.

HYDROTATED ANTHRACITE FUEL CO., INC., Lattimer, Pa.: Contract placed with Wilmot Engineering Co. for complete new breaker to prepare pea, No. 1 buckwheat, rice, barley and Nos. 4 and 5 buckwheat; Wilmot Hydrotators to be used exclusively; "Selectro" screens to be used for dewatering and sizing fine sizes down to 48-mesh; capacity, 650 tons per 7-hour shift; plant to be in operation Oct. 1.

MINE NO. 6, INC., Millfield, Ohio: Contract placed with Morrow Mfg. Co. for screening and washing plant to be equipped with

"WE COULDN'T SAVE 20 CENTS PER TON IN OUR MINE"—

● Most coal operators honestly think their transportation cost, from mine to tipple, is low . . . and when we talk about possible savings of from 10 to 30 cents per ton with S–D 1-2-3 "Automatics", their first reaction oftentimes is, "it can't be done in OUR mine." But the facts are in our records . . . mines from Pennsylvania to Alabama are doing it. Even the most competent operators just can't comprehend how S–D "Automatics" do it, until they get the facts of what others are doing with this new car. Just recently, the president of one firm wrote to us . . . —"our savings alone will pay for the 100 S–D 'Automatics', recently purchased from you, in less than 20 months." This is just one case of many that we will be glad to refer to you for your own investigation.

In addition, these savings are beside other features. The savings in breakage of coal is a big item. S–D "Automatics" don't dump or drop the coal . . . they lay the coal down gently, thru one door at a time. "Automatics" are the only cars that will fill your hopper level full . . . permitting continual mine production in case of breakdown at tipple.

If your cars are obsolete—most cars of only a few years ago are—stop losing money with them . . . get rid of them and install S–D "Automatics", on our rental plan if you prefer.

YOU CAN HAVE THESE SAVINGS WITHOUT INVESTING A DIME.

If you prefer, we will RENT S-D "Automatics" to you on a most liberal plan. These rentals, over 15 years, will average less than 2 cents per ton of coal handled. You pay nothing but rentals on tonnage hauled, and your savings will more than pay the rentals. Get a copy of our rental contract . . . see for yourself what you're missing in profits without S-D "Automatics."

MAIL THIS MEMO NOW

SANFORD-DAY IRON WORKS, Inc.

KNOXVILLE • TENNESSEE

Mine Cars, All Types • Trailers • Wheels • Sheaves

SANFORD-DAY IRON WORKS, INC.
190 Dale Avenue
Knoxville, Tenn.

I'm interested in securing more details of S-D "Automatics" and your liberal rental plan.

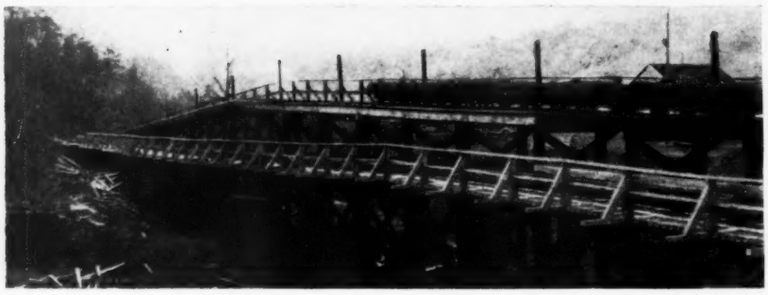
Name .....

Title .....

Company .....

Address .....

Slash Your Maintenance and Replacement Costs By Building with OSMOSE-TREATED Wood!

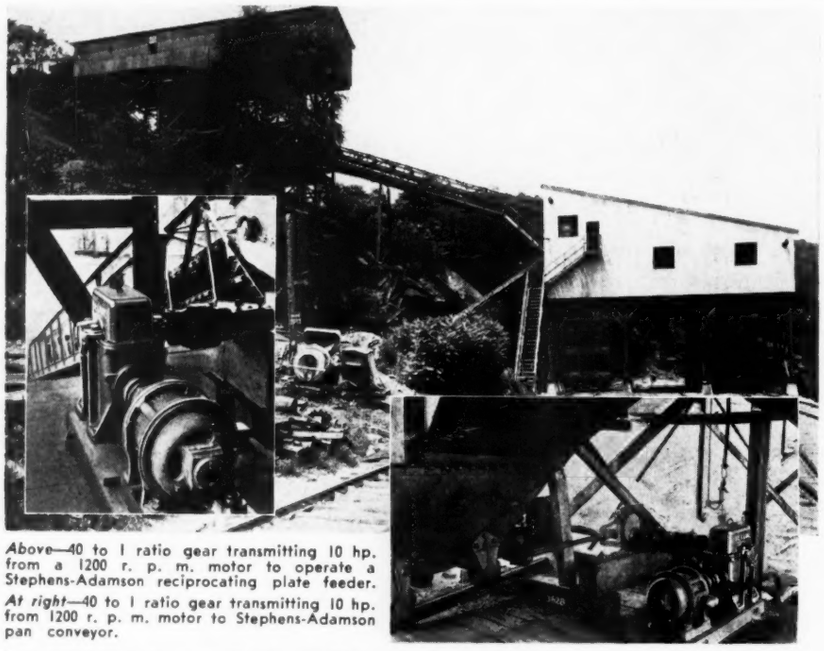


The lighter colored timbers in this photo are Osmose-treated pine timbers used to rebuild sections of a return track trestle at one of Alabama's largest coal mines where untreated timbers had failed.

Above-ground or below-ground, wherever you use bridges, buildings, ties, roof supports, mine cars, etc., you can slash maintenance and replacement costs by using Osmose-treated wood. Osmose treatment increases service life of wood from 3 to 5 times. Requires no heat—or pressure treating equipment, yet secures deep and effective penetration of proved wood preservatives. Treatment is as simple as A-B-C, and costs only a fraction of conventional pressure treatment. Now being used with signal success by leading operators in Alabama, Kentucky and West Virginia. Write for further details.

OSMOSE WOOD PRESERVING CO. of America, Inc.

General Offices: 1437 Bailey Ave., Buffalo, N. Y.
Branch Office: Martin Bldg., Birmingham, Ala.



Above—40 to 1 ratio gear transmitting 10 hp. from a 1200 r. p. m. motor to operate a Stephens-Adamson reciprocating plate feeder.
At right—40 to 1 ratio gear transmitting 10 hp. from 1200 r. p. m. motor to Stephens-Adamson pan conveyor.

Improved coal handling machinery motor driven through DE LAVAL WORM REDUCTION GEARS

at this mine tipple saves $150 per operating day by reducing the percentage of slack coal and by increasing handling efficiency.

Write for Booklet W-1082 on "Worm Gear Drives"

DE LAVAL STEAM TURBINE CO., TRENTON, N. J.

screens, conveyors, booms, crushers, Morrow-Prins washer, sludge tank and conveyor, etc.; capacity, 200 tons per hour of mine-run; washing plant to handle 115 tons per hour of 3x$\frac{3}{8}$-in. coal.

F. C. Morgan Coal Co., Kingman, Ind.: Contract placed with McNally-Pittsburg Mfg. Corporation for washery addition to existing tipple with one McNally-Norton automatic washer to clean 0x6-in. coal at rate of 150 tons per hour, with classification after washing into six different sizes when desired; to be completed about Oct. 1.

Standard Coal Co., Vincennes, Ind.: Contract placed with Jeffrey Mfg. Co. for 7-ft. Baum jig to clean 450 tons per hour of 0x7-in. coal.

•

Recommends Revised Standards For Anthracite Burners

On recommendation of the Anthracite Industries Laboratory there are being offered to producers, distributors and users of domestic burners for Pennsylvania anthracite (underfeed type) recommended revision of Commercial Standard CS48-34 for written acceptance prior to publication by the National Bureau of Standards. In the main the revision, applying to units having a normal capacity between 10 and 100 lb. of coal per hour, is for simplification and provides for 300-hour test to prove compliance with certain requirements.

•

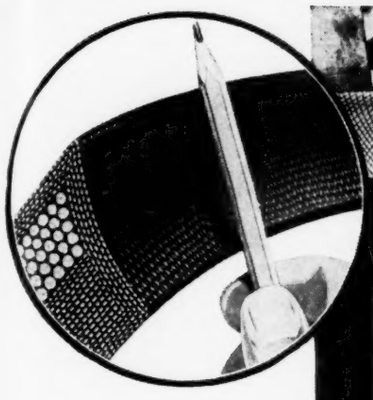
Inter-Industry Drive for Coal Launched in Muncie

A cooperative public relations drive for coal as a fuel for water heaters, cooking ranges, space heaters and central heating plants has been started in Muncie, Ind., with all branches of the coal industry and of coal-burning equipment manufacturers joining hands. An inter-industry committee —representing Anthracite Industries, Inc.; Appalachian Coals, Inc.; Institute of Cooking and Heating Appliance Manufacturers, Battelle Memorial Institute, Bituminous Coal Research, Inc.; National Coal Association, National Warm Air Heating and Air Conditioning Association, and Stoker Manufacturers' Association—is responsible for this movement to stimulate interest in solid-fuel appliances.

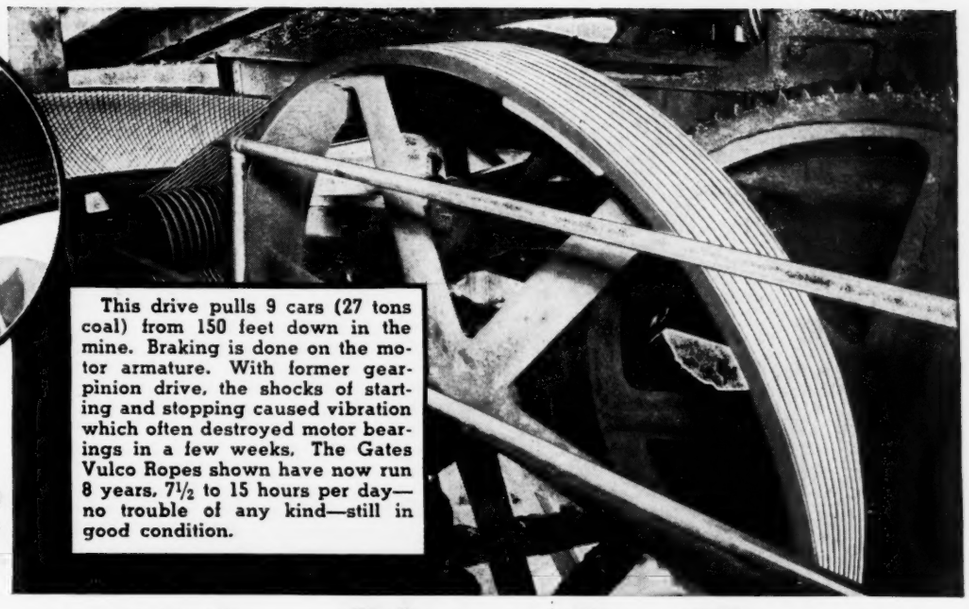
An inter-industry sales promotion campaign is to get under way in Muncie in the near future, activity being carried on by a local committee which will be a counterpart of the national group. Tentative plans call for a "Coal-Burning Week" during which all allied interests will advertise coal and coal-burning equipment by every possible means—to determine what results a united effort will bring. Window displays of products made from coal, newspaper advertising, exhibits of equipment, radio announcements and individual publicity programs of retail coal merchants, and allied dealers—all keyed to the general campaign —are being discussed. Plans include a street parade to include trucks of coal dealers, stoker dealers, range and stove merchants, etc.

Sales promotion representatives of the national inter-industry committee are working with the Muncie group, offering suggestions

(Turn to page 90)



The **Concave Side** IS A GATES PATENT



This drive pulls 9 cars (27 tons coal) from 150 feet down in the mine. Braking is done on the motor armature. With former gear-pinion drive, the shocks of starting and stopping caused vibration which often destroyed motor bearings in a few weeks. The Gates Vulco Ropes shown have now run 8 years, 7½ to 15 hours per day—no trouble of any kind—still in good condition.

Let this Simple Test

Tell you its own story of SAVING in V-Belts and Power

It's a simple matter to learn for yourself how a V-belt with a concave side saves your money.

Just take any V-belt and bend it (as illustrated in the photo above). As the belt bends, grip its sidewalls between your finger and thumb. You will feel those sides bulge outward.

If the belt is a straight-sided belt this bulging gives it a shape like that shown in figure 1 (on the left). Clearly this shape does not fit the sheave groove.

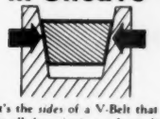
What Happens When a V-Belt Bends

FIG. 1

FIG. 2

But when you bend a belt that is built with the patented Concave side, you find that the sides become perfectly straight—as shown in figure 2. Here are the advantages: This shape exactly fits the sheave groove; this means uniform sidewall wear—*longer life!* Also, the *full* side of the belt is gripping the pulley; therefore less slippage and this saves belts as well as power.

V-Belt in Sheave



It's the *sides* of a V-Belt that do all the *gripping* and get all the *wear*. That's why longer life for the *sides* means *longer life for the belt.*

The Gates Vulco Rope is the only V-belt built with the Patented concave side.

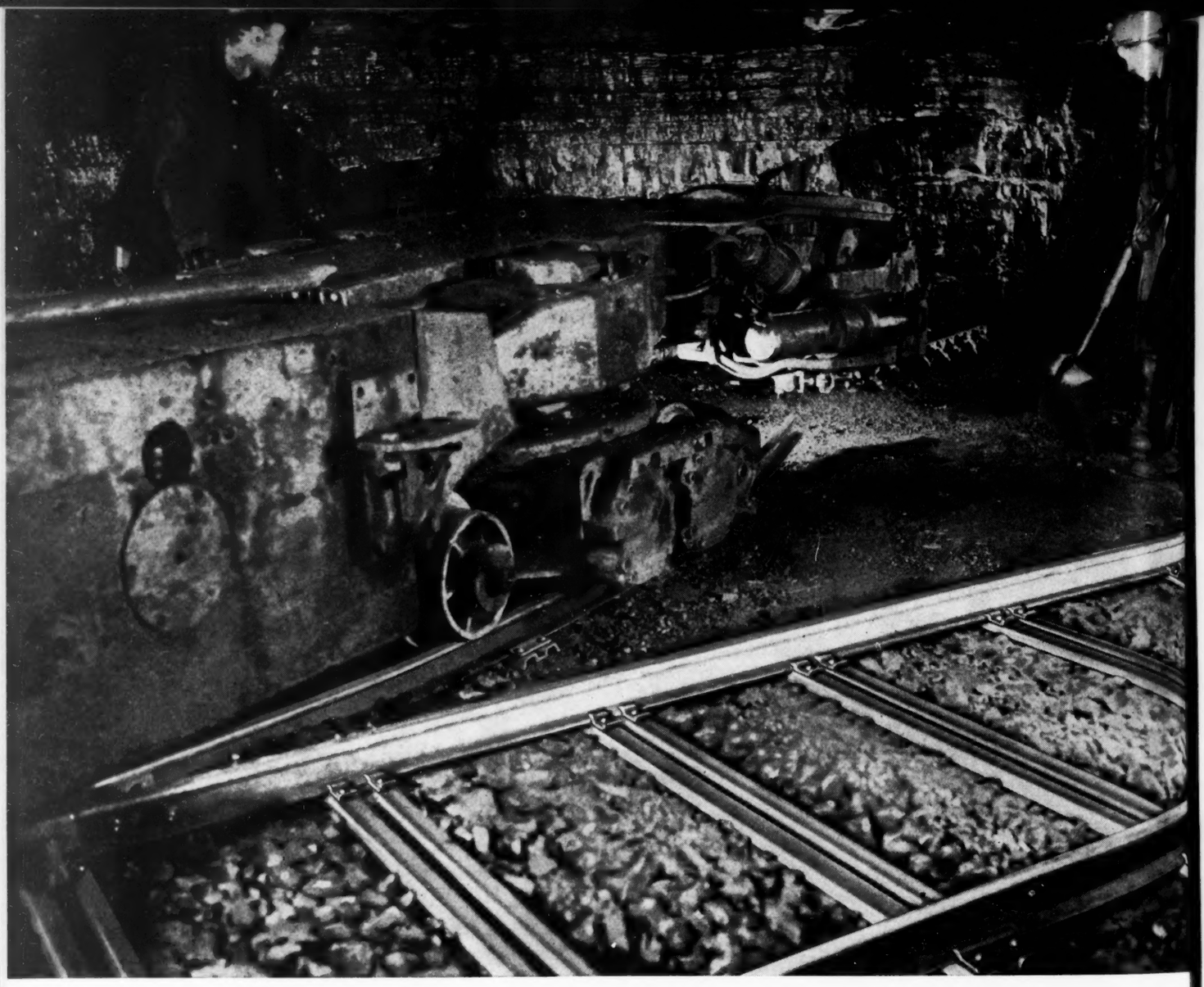
THE GATES RUBBER COMPANY

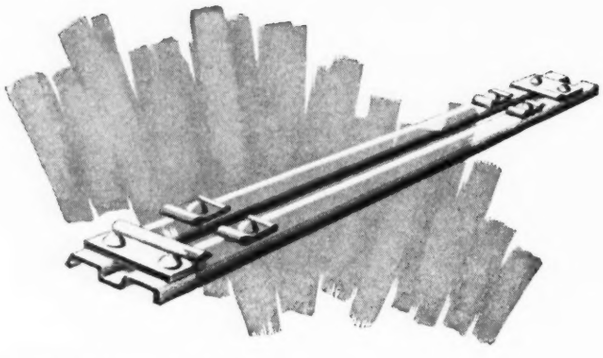
Engineering Offices and Stocks in All Large Industrial Centers

GATES VULCO ROPE DRIVES

CHICAGO, ILL., 1524 South Western Ave. HOBOKEN, N. J., Terminal Building BIRMINGHAM, ALA., 1631 1st Ave., S. LOS ANGELES, CAL., 2240 E. Wash. Blvd.

DENVER, COLO., 999 South Broadway DALLAS, TEX., 2213 Griffin Street PORTLAND, ORE., 333 N. W. 5th Ave. SAN FRANCISCO, CAL., 2700 16th St.





Bethlehem Steel Ties

save installation time. Tie automatically gages track and a single blow on the clip locks tie and rail rigidly together. No rotting, no fire hazard and no spike-killing with steel ties, so you save again in longer tie life.

Bethlehem Solid-type Frogs

outwear ordinary types because they are cast of tough, work-hardening manganese steel which actually builds up resistance under rolling equipment. There are no plates nor rivets to work loose under heavy traffic.

Bethlehem Products for the Mining Industry: Rails . . . Steel Ties . . . Frogs, Switches, Switch Stands, Turnouts and Special Trackwork . . . Track Bolts, Nuts, Spikes . . . Mine Cars . . . Wheels, Axles . . . Bars, Plates, Structural Shapes . . . Steel Construction . . . Steel Timbering . . . Pipe, Boiler Tubes . . . Galvanized Roofing, Siding . . . Wire, Nails, Fence . . . Wire Rope, Strand . . . Drill Steel . . . Forgings . . . Castings . . . Pig Iron.

BETHLEHEM STEEL

MECHANIZATION

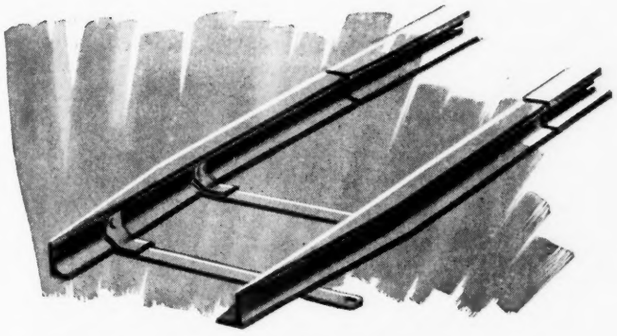
Rides the Rails

MECHANICAL track-mounted cutting and loading puts extra demands on the entire haulage system. Loads are heavier, speeds are faster, and the swifter progress of cutting makes it necessary to lay and re-lay track with minimum delay in order to keep the machines right up to the face.

Ruggedness and durability must combine with ease of installation if the haulage system is to hold its own against the strain of mechanization. Time out for repairs and replacements, time out to cut in new turnouts and lay new track, time out to advance cutters and loaders—these must be kept to the absolute minimum. And only the most sturdy track equipment, specially designed for mine use, can do this job efficiently.

Into its complete line of heavy-duty mine track equipment, Bethlehem has put the toughness, the simplicity, the all-around quality dictated by years of experience in meeting the requirements of mines the country over. Bethlehem Mine Track Equipment has abundant soundness and staying power to stand up under the heavier loads and higher speeds that go with mechanization.

Typical examples of Bethlehem Mine Track Equipment are shown on these pages. The complete line is described in Catalog 72-A. If you would like to receive a copy, write to Bethlehem Steel Company, Bethlehem, Pennsylvania.



Bethlehem Heavy-duty Switches

are half again as heavy as conventional types and long outlast them, yet a complete Bethlehem turnout, mounted on steel ties, has been installed by four men in an hour and a half, an important saving in time.

Bethlehem Parallel-throw Switch Stands

were specially designed for maximum ruggedness and simplicity with minimum height. There are only three sturdy moving parts and all are above the tie for easy maintenance and freedom from cinder clogging.

BETHLEHEM STEEL COMPANY

Here's Why It Will Pay You To Specify

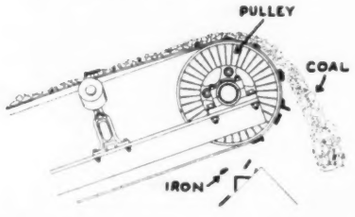
A DINGS MAGNETIC SEPARATOR for your plant!

WHEN you specify a Dings High Intensity Magnetic Separator for a new plant or an old one, you are specifying the finest protection against tramp iron that is available. You are assuring yourself that your coal will be shipped *iron-free from the mine.* You are buying insurance against damage to crushing equipment by tramp iron.

The Dings Magnetic Pulley is the most powerful pulley on the market size for size! It gives you *greater iron-removal power* than any other pulley because the coil covers are made of *bronze* instead of steel which short-circuits lines of force, and because it has nearly *twice* the surface of other pulleys for radiating power-destroying heat!

Moreover, every Dings Separator—pulley, drum, chute type, etc.,—is scientifically designed to do an iron-removal job not possible with "permanent" magnets or improvised electro-magnets. They're built by a firm which has specialized in electro-magnetic equipment for over 40 years. There's a size and type for every plant—for use with belt conveyors, chutes, loading booms, etc.

Here's How the Pulley Works:



Replacing head drive pulley on your present conveyor, the Dings Pulley attracts all iron, holds it to the belt surface until it passes underneath and out of magnetic field where it discharges — simple, positive, completely automatic, dependable.

Write for descriptive literature today. DINGS MAGNETIC SEPARATOR CO., 535 Smith St., Milwaukee, Wisconsin.

World's Largest Exclusive Builders of Magnetic Equipment.

Dings MAGNETIC SEPARATION HIGH INTENSITY

TO BE SAFE, BE SURE IT'S A DINGS

The Cincinnati

TRADE MARK

ONE MAN COAL DRILL

. . . lowers drilling costs because it is designed and constructed to give more power "pound for pound" and more drilling efficiency "day after day." Used successfully in drilling both anthracite and bituminous coal. Easy to operate, easy to handle. Sold with a money-back guarantee. Write today.

Write today for FREE illustrated bulletin

The Cincinnati Electrical Tool Co.

Division of The R. K. LeBlond Machine Tool Co.

2677 Madison Rd., CINCINNATI, OHIO

Permissible Plates Issued

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in July, as follows:

Sullivan Machinery Co.: Type 7-B-1 shortwall mining machine; 50-hp. motor, 550 volts, d.c.; Approval 407A; July 17.

Goodman Manufacturing Co.: Type 90-L chain conveyor; 10-hp. motor, 500 volts, d.c.; Approval 365A; July 30.

and submitting ideas. R. E. Howe, president; J. E. Tobey, vice-president in charge of engineering, and T. A. Day, manager, Southeastern office, are Appalachian Coals representatives on the national committee. Marc G. Bluth is representing the National Coal Association and Stoker Manufacturers' Association, while Samuel Dunckel, managing director, Institute of Cooking and Heating Appliance Manufacturers, is representing the cooking-range and space-heater companies. G. Don Sullivan, secretary, Indiana Retail Coal Merchants' Association, is cooperating with Muncie retailers in formulating plans for "Coal Burning Week."

Four West Kentucky Companies Sign U.M.W. Contracts

A closed shop contract between the United Mine Workers and four west Kentucky coal companies was signed at Madisonville, Ky., on Aug. 12. The agreement, affecting nearly 1,000 men in Hopkins, Webster and Christian counties, was signed by representatives of the Norton Coal Co., Williams Coal Co., Flat Creek Coal Co. and the Hart Coal Co. and officials of district 23, U.M.W.

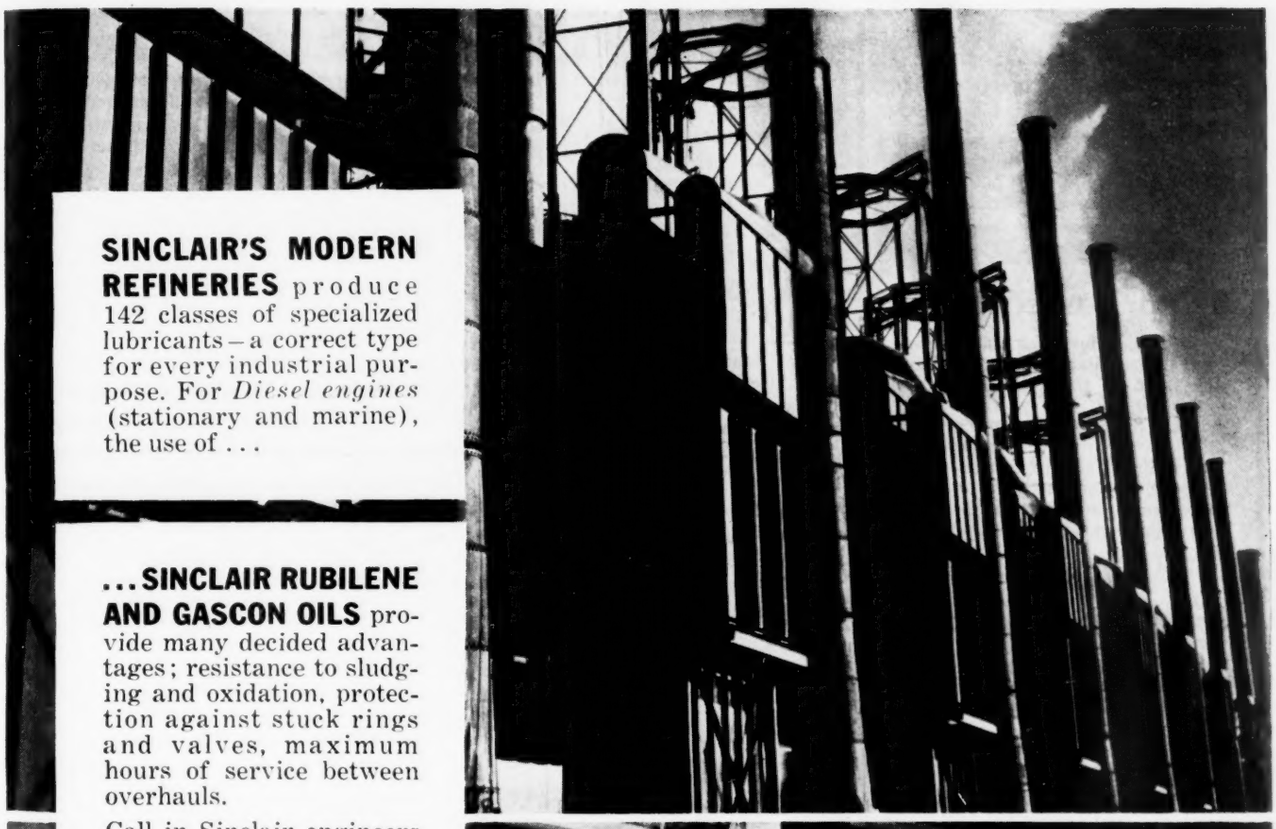
Under the terms of the new agreement the miners will receive wage increases as well as a reduction in working hours from eight to seven per day. The settlement followed two months of negotiations which were inaugurated following National Labor Relations Board elections at the mines in December, which resulted in the U.M.W. being designated as bargaining agent for the miners.

Obituary

A. E. Giles, chief electrician for the Chicago, Wilmington & Franklin Coal Co.'s New Orient mine, West Frankfort, Ill., for its first fourteen or fifteen years, died Aug. 1. He had much to do with the original electrical layout and its successful operation.

Morris M. Sharp, 49, assistant manager of the Peabody Coal Co.'s Majestic No. 14 mine, Duquoin, Ill., died Aug. 10 after an illness of several months. He had formerly been connected with the Madison Coal Corporation.

A. W. Evans, 70, mining engineer and former chief mine inspector of Tennessee, died July 3 in Knoxville, Tenn. He had had a long and active career in the coal mining industry, including three terms as superintendent of the Brushy Mountain



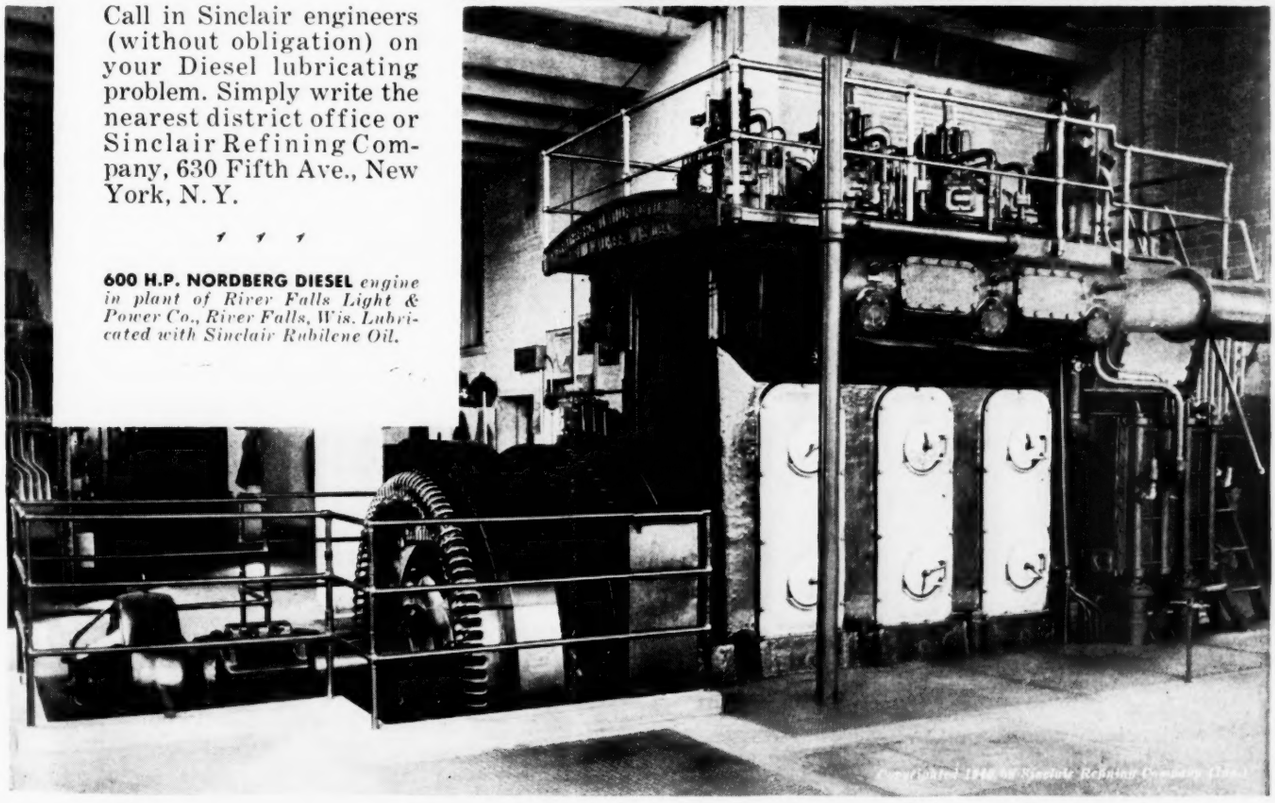
SINCLAIR'S MODERN REFINERIES produce 142 classes of specialized lubricants—a correct type for every industrial purpose. For *Diesel engines* (stationary and marine), the use of . . .

. . . SINCLAIR RUBILENE AND GASCON OILS provide many decided advantages; resistance to sludging and oxidation, protection against stuck rings and valves, maximum hours of service between overhauls.

Call in Sinclair engineers (without obligation) on your Diesel lubricating problem. Simply write the nearest district office or Sinclair Refining Company, 630 Fifth Ave., New York, N. Y.

* * *

600 H.P. NORDBERG DIESEL *engine in plant of River Falls Light & Power Co., River Falls, Wis. Lubricated with Sinclair Rubilene Oil.*



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FOR SAFETY'S SAKE, SUPERIOR COUPLINGS

Drop Forged Links

Drop forged for strength, Superior Swivel and Single Link Couplings are built to stand the gaff. No welds to let go with resulting wrecks. Superior Couplings on your mine cars will prevent accidents and reduce haulage costs. Order Superior Couplings for your replacements and specify them on new equipment.

DROP FORGED SWIVEL COUPLINGS

PITTSBURGH
KNIFE & FORGE CO.
Park Building
PITTSBURGH, PENNSYLVANIA

Mines and climaxed with seven years as chief mine inspector, 1930-37. He invented a drop-bottom mine car and was a contributor to *Coal Age* and other technical publications.

WILLIAM H. LINDSEY, president of the Crescent Coal Co., with offices in Nashville, Tenn., and operating at Bevier, Ky., died suddenly July 27. He was at one time also president of American Mining Congress.

JOSEPH P. BOYCE, 56, surveyor for Canadian Collieries, Ltd., in the Nanaimo district, British Columbia, and widely known in coal-mining circles, died suddenly Aug. 16 at Nanaimo. He was born in Texas but had lived in Nanaimo for many years. He became affiliated with the Western Fuel Corporation in 1908 as surveyor and engineer, and joined Canadian Collieries when it took over the Western's operations in 1928.

WILLIAM L. FEWSMITH, 61, manager of publicity and advertising for Robins Conveying Belt Co., Passaic, N. J., died Aug. 15 after a brief illness while on vacation at Port Carling, Ontario, Canada. He joined the Robins organization in 1913 as a civil engineer and had been continuously employed as civil and mechanical engineer until 1924, when he was given charge of publicity and advertising.

•

Vulcan Iron Works Reorganized

Controlling interest in the Vulcan Iron Works, Wilkes-Barre, Pa., having passed into the hands of new owners on July 29, S. T. Nicholson, formerly president, became chairman of the board, and E. P. Holder was elected president. George H. Brown will continue as sales manager, and William E. Willingale will be credit and collection manager and assistant treasurer.

Mr. Nicholson announced that all present facilities would be utilized in producing the varied line of machinery for which the company is noted, including small locomotives, mining and cement machinery, electric hoists, etc. Excess facilities, he stated, would be available for any work assigned to the company in the national defense program.

•

Logan County Coal Operators Sponsor Radio Program

The Logan County King Koal Variety Show is a new radio program being broadcast every Sunday afternoon from radio station WLOG, Logan, W. Va. Shortly after the opening of the station, on June 1, fourteen of the coal producers in Logan County initiated the show for the purpose of intensifying safety consciousness in their employees.

Coal companies sponsoring the program are: Island Creek Coal Co., Monitor Coal & Coke Co., Gay Coal & Coke Co., Elk Creek Coal Co., Buffalo Chilton Coal Co., Winisle Coal Corporation, Guyan Eagle Coal Co., Hutchinson Coal Co., Utilities Coal Co., Mallory Coal Co., Youngstown Mines Corporation, Georges Creek Coal Co., West Virginia Coal & Coke Corporation, and the Clean Eagle Coal Co.

•

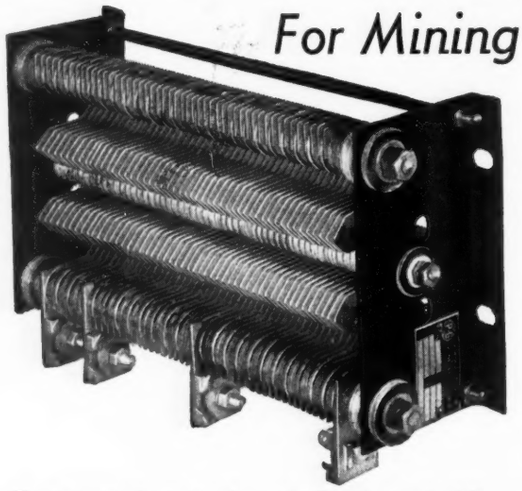
Minimum Age of 18 Is Set For Coal Mine Labor

An order declaring employment in coal mines hazardous for minors between sixteen and eighteen years of age was issued Aug. 2 by Katharine F. Lenroot, chief of the Children's Bureau of the U. S. Department of Labor. The order, effective Sept. 1, establishes an eighteen-year minimum age under the child labor provisions of the Fair Labor Standards Act for most employment in and about coal mines (see *Coal Age*, July, 1940, p. 78).

Both anthracite and bituminous mines whose products are shipped in interstate commerce are affected by the order, but not mines producing minerals or rock products. The order declares that all occupations in underground coal mines and in the pits of stripping operations are hazardous. It also classifies as hazardous most surface occupations, but excepts from the application of the order slate or other refuse picking at picking tables or picking chutes in tipples or breakers, and occupations requiring the performance of duties solely in offices or repair or maintenance shops located in the surface part of coal-mining plants. Miss Lenroot pointed out, however, that the exemption for work in offices and repair shops does not apply if the worker is permitted to go underground. It also was pointed out that the exemption for slate pickers does not apply where slate is picked from railroad cars as they are being loaded.

Mine operators covered by this order, Miss Lenroot added, should obtain and keep on file certificates of age for all employees

P-G STEEL GRID RESISTOR
For Mining Machines



90-DAY FREE TRIAL!

•

DEPENDABLE SERVICE GUARANTEED

Constructed entirely of Steel and Mica, it is not affected by vibration or moisture. Nothing to break — Continuous *Trouble-Free* Service is assured. Built to fit your present resistor space.

"The RESISTOR you can INSTALL and FORGET"

P-G THE POST-GLOVER ELECTRIC CO.
• ESTABLISHED 1891 •
221 WEST THIRD STREET, CINCINNATI, OHIO

How thorough lubrication lengthens the service life of wire rope

This is No. 5 in a series of informative articles for Wire Rope users prepared by the Macwhyte Wire Rope Company.

The importance of thorough Wire Rope lubrication in obtaining safe and economical service cannot be overestimated.

Wire Rope is a complicated piece of machinery. A 6 x 19 rope, for instance, is made up of 114 wires plus a core (which may be hemp, or an independent wire rope center).

As the rope bends over sheaves and drums the wires continually move and rub against each other. Each wire becomes a bearing surface that grinds and wears against other wires—unless all are properly lubricated.

Proper lubrication is just as important to wires in your rope as it is to gears in your car.

Two Lubricating Methods

1. Internal Lubrication. A most effective internal lubrication has been pioneered by Macwhyte. During the rope's manufacture each wire is thoroughly covered, spaces between wires completely filled, with a special lubricant. This compound does not dry or flake off in extreme cold. It does not melt or run under summer heat.* This special lubricant protects against internal friction and corrosion.

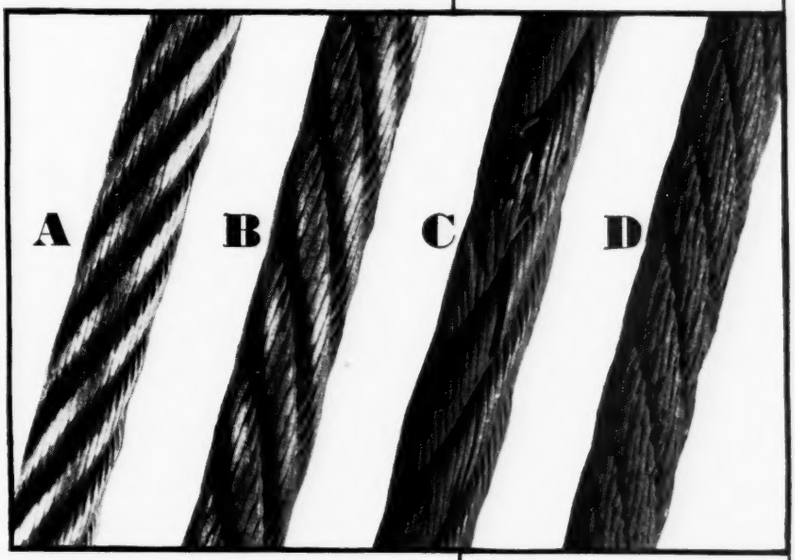
2. External lubrication, applied on the job, acts to seal in the internal lubrication. It also guards external wires against corrosion and reduces abrasion.

CONCLUSION: If a wire rope user wants the greatest possible service from wire rope, it is wise to buy a rope which is internally lubricated during manufacture (not all ropes are). No external applications applied later can possibly reach the inside wires where it is needed most.

Engineering Service

Use Macwhyte Engineering Service—a wire rope or lubrication recommendation may save you many dollars. It's a part of our friendly service to help you get the most from your wire rope dollar.

*For complete information ask for interesting folder, "The WHY IN MACWHYTE Internal Lubrication."



MACWHYTE COMPANY
2940 Fourteenth Avenue, Kenosha, Wisconsin
Manufacturers of Rope Wire—Braided Wire Rope Slings—Monel Metal Wire Rope—Stainless Steel Wire Rope—Cable, Tie-Rods, and "Safe-Lock" Terminals for Aircraft; Wire Ropes for all industrial requirements.

NO. 483

FROM THE FIELD

A This rope contains Macwhyte's Special Internal Lubrication. External lubrication was applied periodically during service. *Result:* Uniform wear, maximum service.

B This rope was internally and externally lubricated with Macwhyte's Special Lubricant during fabrication. It was never externally lubricated in service, however. *Result:* efficient service, but had to be removed prematurely because exposed outer wire became rusty. When removed from job inner wires were still in good condition and well lubricated—indicating that external application of a good lubricant would have prolonged rope life.

C No internal or external lubrication was applied to rope "C." Strands and wires became frozen, which eliminated freedom of wire and strand movement when the rope flexed over sheaves. *Result:* Premature rope failure before wires had received normal wear.

D An idle rope should always be kept lubricated. Rope "D" was removed from service and stored for future use. Not being protected, however, rust and corrosion set in and ruined the rope. *Result:* unnecessary waste and high rope cost that lubrication could have prevented.

MACWHYTE
Whyte Strand
PREformed WIRE ROPE
The Wire Rope with THE Internal Lubrication

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COAL AGE'S "SEE ALL" TRIP!

OCTOBER BRINGS a rare treat to upwards of 11,500 paid subscribers to COAL AGE . . . Don't miss the editors' elaborate presentation of operating policies and methods throughout the mines of 17 leading producers in the record-making Southern Illinois field . . . nor our advertisers' "Tell All" messages about the pace their products are setting.

ADVERTISERS PLEASE NOTE
Your cooperation in supplying complete copy and cuts as early as possible for this big edition will be appreciated . . . Last forms for press must close September 23rd.

eighteen and nineteen years of age employed in or about coal mines. The act provides that a certificate of age showing a minor employee to be above the minimum age for the occupation in which he is to be engaged, issued in accordance with regulations of the chief of the Bureau, protects the employer from unintentional violation of the minimum-age standards.

•

Erie Coal Mine Team Leads Colorado First-Aid Meet

The first-aid team of the Clayton-Morrison Coal Co. mine at Erie, Colo., was adjudged the best in the State at the first annual safety field day, held Aug. 1 by the Colorado Industrial First-Aid and Accident Prevention Committee in Civic Center, Denver. Compiling 1,497 out of a possible 1,500 points, the winner outscored 62 other teams in 20 subdivisions. Matthew Gould, captain of the winning team, was presented with the meet's grand prize, the first prize in the coal-mine division, and the Governor's safety trophy. Members of the team were awarded individual medals by the National Safety Council.

Second place in the coal-mine division was captured by the Rocky Mountain Fuel Co. team from the Columbine mine, at Serene, under Captain Frank Salisbury, with 1,496 points; third, Kebler No. 2 mine, Colorado Fuel & Iron Corporation, 1,494. The Farr team of the Colorado Fuel & Iron Corporation, under Louis Nardine, was first in the boys' division. In the girls' division, the Juanita Coal & Iron team, from Bowie, captained by Amelia Emmons, was first.

•

Nuttallburg Mine Resumes

Operations have been resumed at the Nuttallburg mine of the Maryland New River Coal Co., Nuttallburg, W. Va., after a shutdown of six months.

•

Bellemeade Runs Morrison Plant

The Bellemeade Coal Co., Inc., announced that as of Aug. 12 it was taking over operation at Glen Morrison, W. Va., of the Morrison Coal Co. Production was expected to amount initially to ten carloads per day with 75 men employed. The Morrison company several months ago permitted its lease on the coal lands to revert to the Bellemeade organization, headed by C. H. Meade, of Pineville, W. Va.

•

Truck Control Broadened

In a ruling issued late in July, the Interstate Commerce Commission broadened the exemption clause in its rule requiring truck and bus drivers to keep logs of interstate trips so as to exclude carriers operating in metropolitan areas cut by State lines. The original exemption affected only drivers in interstate or foreign commerce operating wholly within the limits of a city or "between contiguous municipalities." The changed version excludes from the regulation drivers operating on regular schedules, over regular

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Erecting a "Pennsylvania" BRADMILL for preparing PREMIUM Stoker coal.

Tests made in 3 different types, leading to selection of equipment for preparing 1¼"x⅛" Domestic Stoker coal, indicated approx. 22%, and 16% minus ⅛" from two types, with varying amounts of oversize, while the BRADMILL test showed less than 9% ⅛" and *no* oversize.

With more than $1.00 differential between Stoker coal, and the ⅛" fines, savings show early amortization of the investment made in the BRADMILL.

On receipt of your Stoker Coal specifications, we will be glad to make recommendations and quotation on indicated equipment.

Ask for Bulletin 8001

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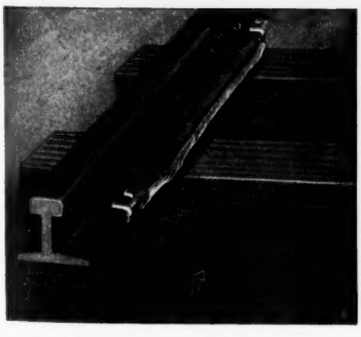
RAIL BONDS



The fact that Mesco Rail Bonds are Flash Welded means they are EXTRA STRONG at the terminals. Flash Welding makes welds which are almost entirely oxygen-free, pays off in greater terminal strength and lower resistance.

Mosebach Flash Welded Rail Bonds are made in seven styles, for every bonding requirement. A complete installation will save you money in welding, power and replacement costs. Write for complete data and prices.

MOSEBACH
ELECTRIC & SUPPLY COMPANY
1115 Arlington Avenue Pittsburgh, Pa.

routes, mainly in urban and suburban areas, and when such regular routes are not more than 35 miles from the terminal to the point of return.

Revision is intended to cover such cases as coal trucks which, on regular routes, cross and recross State lines several times a day, and often stop in suburban communities not actually adjacent to the community in which the starting point is located.

•

Accuse Sahara Coal Co. In Reopening Mine

Charges of unfair labor practices by the Sahara Coal Co., Harrisburg, Ill., were filed in the second week in August with the St. Louis office of the National Labor Relations Board by 67 former employees. The complainants allege the company has refused to rehire them because of union activities.

According to the petition, the company is now operating a slope mine to take out coal which formerly was brought out through a shaft flooded in 1937 but which was pumped out with money provided by the Illinois Legislature on the understanding that the petitioners and other members of Local Union No. 105, Progressive Miners, would be rehired when the mine was reopened. The petitioners allege that when they requested their jobs back, the company contended that the operation was a new mine, and refused to rehire them.

Miss Dorothea de Schweinitz, regional director of the N.L.R.B., said a study was being made to determine if the charges were violations of the National Labor Relations Act.

•

Continental Colliery Reopens

The Continental colliery of the Hazle Brook Coal Co., near Centralia, Pa., was reopened late in July after being idle for some time as the result of a fire.

•

Peale to Operate Lincoln Mine

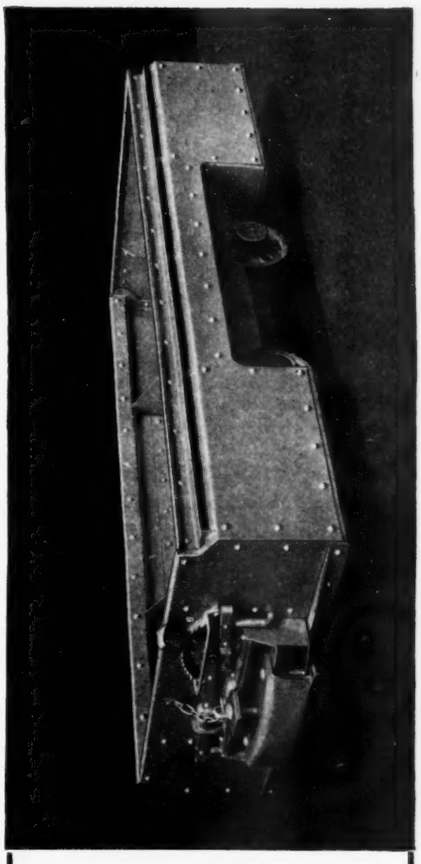
Negotiations have been completed between W. A. Marshall, president, Lincoln Coal Co., and the Peale interests whereby operation of the Lincoln No. 1 mine, at Nanty Glo, Pa., will be taken over by the Springfield Coal Corporation, St. Benedict, Pa. Rembrandt Peale, Jr., is president of the latter company and David Davidson is general superintendent.

•

Oppose Gas Line to Tennessee

Coal Interests in Tennessee, Kentucky, Virginia and Alabama have organized opposition to proposed extension of a natural gas line from Louisiana into Tennessee. A hearing on a permit to pipe gas into Tennessee is scheduled before the Federal Power Commission on Sept. 4.

"Such a line would strike at the very heart of the southern Appalachian coal area," said L. C. Gunter, president, Southern Appalachian Coal Operators Association. "Moreover, if natural gas were brought here it would be a heavy blow to electric power produced by the Tennessee Valley Authority." Mr. Gunter added he did not believe



ONE OF 800

Overall dimensions: 27" high, 12' 2" long, 5' 4" wide—level full capacity, 90 cu. ft. High strength corrosion resistant steel plates, spring buff and draft gear, simple, efficient brakes. High strength double web chilled cast iron wheels, 14" diameter—mounted on Timken bearings.

•

A *maximum* capacity mine car with *minimum* weight, built to either your specifications or ours—*that's* what you get when you choose BROWN-FAYRO Mine Cars.

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such action would be in the public interest and said the coal operators had received pledges of support from the United Mine Workers and from railroad interests which draw a large portion of their revenue from coal shipments.

•

Slagle Mine Running Again

Idle since February because of a fire which destroyed mine tipple, store building and mine office, entailing a loss of about $150,000, the Slagle mine of the Logan County Coal Corporation, Slagle, W. Va., resumed operations late in July, according to an announcement by W. W. Beddow, general manager. With the resumption of operations 200 men returned to work. The new tipple cost $150,000.

To Develop New Tract

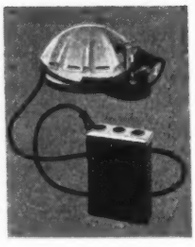
Mon-Valley Coal & Lumber Co., of which T. J. Johnson is president, has purchased 630 acres of Pittsburgh coal land in Dunkard Township, Monongalia County, W. Va., which it plans to develop and mine. According to Mr. Johnson, output will be prepared in the tipple of the Rosedale Coal Co., owned by the same interests.

•

United Electric Gets Loan

United Electric Coal Cos., Chicago, completed negotiation of a $2,000,000 five-year debenture loan at 3 per cent with the Chase National Bank, Bank of the Manhattan Co., and Bank of New York late in July. According to Frank F. Kolbe, president of

BRIGHTEST OF ALL!



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Portable's Cap Lamp is the brightest Bureau of Mines approved lamp on the market today. That means a lot in efficiency and safety, for it stands to reason that the better a man can see, the better he can work.

More important still is the fact that Portable's Lamp stays bright! Issued under the Bureau of Mines 12-Hour Burning Schedule, Portable's Battery suffers little from fatigue, provides adequate working light from beginning to end of shift. It is the only battery backed by the guarantee that it will never drop to less than 80% of full capacity.

It will pay you to investigate these and many other features of Portable's Cap Lamp systems. Write for descriptive literature and details of Portable's 12-month contract.

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Cool Caps and Hats Electric Cap Lamps Safety Lamps
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CUMMINS Dependable DIESELS *"Really take the Dirt"*

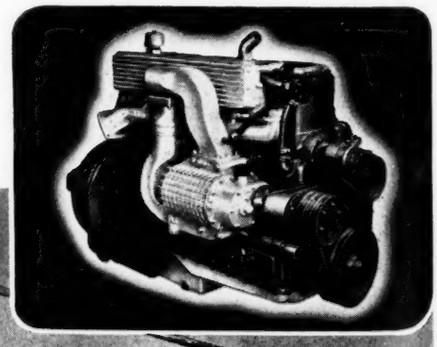
The G. & F. Corporation, Brazil, Indiana, uses three Cummins Diesel-powered draglines—two 4-yard Lima's and one 2-yard Bucyrus-Erie—to supply Indiana's largest truck tipple which dispenses 2,400 tons every 24 hours.

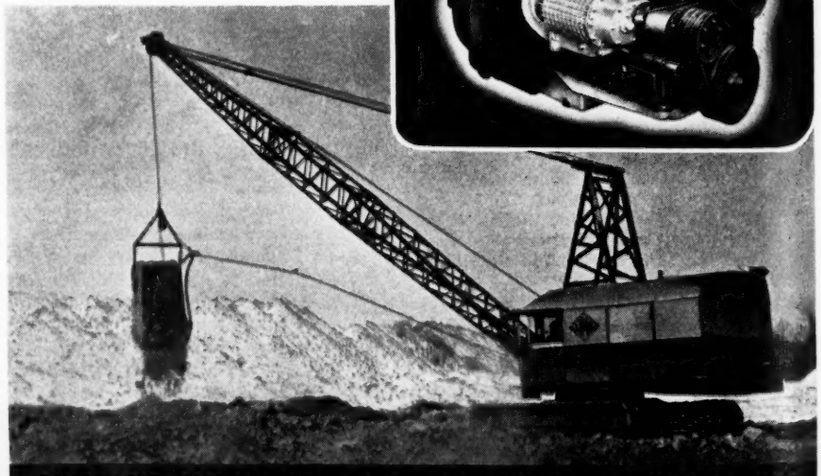
Says Vern Howald, mine superintendent, of Cummins Dependable Diesels: "Cummins Diesel power will really take the dirt. The power is smoother, a lot cheaper and more dependable. The engine is less complicated . . . with it, we had very little mechanical maintenance expense."

Cummins Dependable Diesels are economical to operate and maintain . . . completely dependable—are the proved power for every coal mining operation . . . stripping . . . pumping . . . cutting . . . ventilation . . . power generation for preparation . . . haulage . . . locomotives. Cummins Engine Company, 4416 Wilson Street, Columbus, Indiana.

Model HBIS-600 (Supercharged) Cummins Dependable Diesel. 175 hp. at 1800 rpm.

G. & F.'s two Lima's are powered with Model LI-600 Cummins Diesels. The Bucyrus-Erie is powered with a new supercharged Model HBIS-600 Cummins Diesel.





CUMMINS ENGINE CO., 4416 WILSON ST., COLUMBUS, IND.

United Electric, $750,000 of the new loan will be used for capital improvements and the balance will be used to repay an existing 4½ per cent bank loan. The new loan will be repaid at the rate of 20c. a ton of coal sold, with a minimum yearly payment of $350,000.

•

Appalachian Exhibit Opens With Full House

BLUEFIELD, W. VA., Aug. 22— With every available booth filled and more than 150 manufacturers and other exhibitors represented, the sixth annual Southern Appalachian Industrial Exhibit opened today and will continue two more days. As in past years, the show is being held in the freight terminal of the Norfolk & Western Ry. However, the tarpaulin covering formerly used over the center aisle has been replaced with a wooden roof.

The exhibit again includes a mine-gadget contest with prizes for the outstanding ideas. Today, in the N. & W. assembly room, six industrial motion pictures were shown, and nine others are scheduled for tomorrow and Saturday. The Old Timers' Club also will meet tomorrow to introduce new members and award prizes.

Exhibits run the whole gamut of machinery, supplies and service for coal mining. The larger types of equipment such as complete loaders and cutters are shown only in photographs, though one mine-car manufacturer has on display a large low-type car.

The exhibition is held under the auspices of the Pocahontas Electrical and Mechanical Institute and in cooperation with the Pocahontas Operators' Association. Harry C. Faust, general manager, United Pocahontas Coal Co., is general chairman of the show; the director is B. S. Housman, who is assistant to W. E. E. Koepler, secretary of the operators' association, and the general superintendent is S. S. Cooper, chief electrician of the American Coal Co. of Allegany County.

•

Trade Literature

AIR COMPRESSORS—Schramm, Inc., West Chester, Pa. Bulletin 4015-9 details salient features of "Fordair" compressors—new Model 60—giving specifications.

AIR-PRESSURE GAGES—F. W. Dwyer Mfg. Co., Chicago. Bulletin 31 describes Dwyer transparent stationary draft gages, giving new listings as well as complete data on applications and specifications.

AUTOMATIC DUMP PRIMERS — DeLaval Steam Turbine Co., Trenton, N. J. Leaflet describes automatic priming systems for centrifugal pumps operated singly or in groups.

CENTRALIZED LUBRICATION SYSTEM—Farval Corporation, Cleveland, Ohio. Bulletin 10-A describes Dualine Jr. centralized system providing suitable distribution of oil or grease to any number of bearings on smaller machines.

CIRCUIT BREAKER SWITCHGEAR—Roller-Smith Co., Bethlehem, Pa. Catalog 1230 illustrates and describes the company's low voltage metal-inclosed air circuit breaker switchgear, showing arrangement and giving general specifications.

COAL-CLEANING EQUIPMENT—E. I. duPont de Nemours & Co., Wilmington, Del. Bulletins 1289 and 1290 describe the duPont minerals separation process for cleaning coal and concentrating minerals, the latter with particular reference to cleaning buckwheat sizes of anthracite.

COLD FINISHED BARS—Joseph T. Ryerson & Son, Inc., Chicago. Bulletin gives complete description of the company's stock of cold finished steel bars, with chemical analysis, working properties, etc.

EARTH-MOVING EQUIPMENT—R. G. LeTourneau, Inc., Peoria, Ill., has issued the following bulletins: Form TP-103, describing the Model C Tournapull; A-113, on Angledozers and Bulldozers; 0-116, Rooters, A-114, Carryall scrapers.

ELECTRICAL EQUIPMENT — Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has issued the following literature: Descriptive Data 3105, describing Type CS totally inclosed fan-cooled squirrel-cage motors; Catalog Section 43-205, on rectangular case switchboard instruments, types HA, HX, HY, and HZ; Catalog Section 26-325, describing the Type WT-4 portable modern AC welder.

FLAME HARDENING APPARATUS—Air Reduction Co., New York City. Bulletin provides details on the considerations and apparatus involved in flame hardening surfaces of various forms, describing specifically the Airco Style 4383 water-cooled flame hardening torch and the variety of extensions and types of tips available for use with it.

HOIST BUCKETS—Blaw-Knox Co., Pittsburgh, Pa. Catalog 1696 describes buckets for single-drum hoists in a number of varieties, with application data.

LUBRICANTS—E. F. Houghton & Co., Philadelphia, Pa. Bulletin lists five outstanding advantages of "Sta-Put" lubricants, advancing claims for three series to cover practically every lubrication problem.

METALLIZING EQUIPMENT—Metallizing Engineering Co., Inc., Long Island City, N. Y., announces the first issue of *Metco News*, a periodical devoted entirely to the latest developments and applications of the metal spraying process.

OIL COOLERS—Condenser Service & Engineering Co., Hoboken, N. J. Catalog 31 presents features of the company's lubricating oil coolers, giving construction details capacities and pressure drop.

ROPE DRIVE—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin B-6051-A presents facts and data essential in estimating costs, types and sizes of V-belt drive equipment. It contains information on Texrope belts, Texsteel, Texdrive and regular cast-iron sheaves.

STOKER — Combustion Engineering Co., Inc., New York City. Catalog MR-4 gives details of the most recent design of C-E multiple-retort stoker, Type MRO, describing its engineering background, operation and principal features.

SCALE AND RUST REMOVAL—Oakite Products, Inc., New York City. Booklet Form 4305-R1 describes Oakite Compound No. 32, designed to provide safe, effective descaling of many different types of water-cooled equipment without the need of expensive mechanical methods.

STOKER-COAL CRUSHERS — McNally-Pittsburg Mfg. Corporation, Pittsburg, Kan. Bulletin 740 cites in word and picture the advantages of its stoker coal crushers, giving much tabular data.

SYNCHRONOUS MOTOR CONTROL—Electric Machinery Mfg. Co., Minneapolis, Minn. Publication 159 describes polarized field frequency automatic control for synchronous motors. Function and construction of the control parts are explained, and connections of a typical control are illustrated.

TRANSMISSION LINE MATERIALS—Ohio Brass Co., Mansfield, Ohio. Templet sheet for use in preparing drawings shows four suspension insulators, a Clamptop pintype, thirteen other pintype insulators, and fourteen hardware items including a new style dead-end thimble, an improved angle clamp, both the Swing-Link and Clamptop ground wire brackets for wood poles, and the intermediate Universal strain clamp.

WASTE PURIFICATION—Gale Oil Separator Co., Inc., New York City. Bulletin describes principles by which fluids of different specific gravities may be separated in order to purify waste and reclaim valuable constituents, with special reference to the Gale liquid separator.

•

Raven Coals Acquires Tract

Raven Coals, Inc., formed by Emmet S. Pugh, president of Raven Red Ash Coal Co., and associates, of Beckley, W. Va., has leased about 1,250 acres of coal land near Richlands, Va., and expects to begin operation by Nov. 1. The operation will have a five-track tipple, and the product will be washed, air-cleaned and treated.

•

Katherine Company Expands

The Katherine Coal Mining Co. has enlarged the scope of its operations since acquiring three tracts of coal land covering about 900 acres north of Lumberport, W. Va. The tracts are in the vicinity of the Riverside and Corado mines on the West Fork River. The company is operating an additional mine, known as Katherine No. 3, in development of the property.

•

Industrial Notes

NORDBERG MFG. CO., Milwaukee, Wis., has appointed Clinton E. Stryker vice-president and assistant to the president. He is a graduate of the Armour Institute of Technology, was with the Fansteel Metallurgical Corporation for a number of years, and for the last five years has been with McKinsey, Kearney & Co., management engineers.

FALK CORPORATION, Milwaukee, Wis., has elected M. A. Carpenter as executive vice-president and a director. He has been with the company sixteen years,

JOHN A. ROEBLING'S SONS CO., Trenton, N. J., manufacturer of wire rope, electrical wires and cables, strip steel and other wire specialties, has created a new export divi-

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More Certain and Sensitive in indication of Gas, Due to Greater Flame Intensity and Steadiness.

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THE CONCENCO ANTI-FRICTION HEAD MOTION

With *SuperDuty* Deister-Overstrom Diagonal-Deck Coal Washing Tables, the Concenco Head Motion offers unusual efficiency and economy. Its smooth, quiet, mechanical action with more kick assures economical long-lived service, greater capacities and superior washing.

THE DEISTER CONCENTRATOR COMPANY
THE ORIGINAL DEISTER CO.
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sion to be located at 19 Rector St., New York City, with William P. Laseter as manager.

ALLIS-CHALMERS MFG. Co., Milwaukee, Wis., has appointed F. J. Geiger as assistant manager of the electrical department, in charge of sales and engineering at the Norwood (Ohio) plant. Frank R. Freyler has been transferred from the Philadelphia office to the Norwood plant to take over Mr. Geiger's former duties as assistant manager of sales.

•

Crab Orchard Co. Organized

Crab Orchard Coal Co. has been incorporated by Roland R. Wilson, Louis Pulley and George A. Wallace, of Marion, Ill. A slope mine will be sunk near the village of Crab Orchard. The location indicates that this will be a truck mine, the names of the incorporators suggesting that it will be one of the best equipped operations in this prolific trucking field.

•

Stoker Men Name Chairmen

Chairmen of standing committees, Stoker Manufacturers Association for the ensuing year have been announced by President Frank Hoke, vice-president, Holcomb & Hoke Mfg. Co., as follows: advertising and public relations, J. M. McClintock, Illinois Iron & Bolt Co.; commercial, B. O. Fink, Auburn Foundry, Inc.; business standards, A. D. Scoville, Cotta Transmission Corporation; legislative, R. C. Goddard, Combustioneer Division, Steel Products Engineering Co.; engineering and research, E. C. Webb, Iron Fireman Mfg. Co.; ways and means, J. E. Martin, Link-Belt Co.; traffic, C. J. Incrocci, Link-Belt Co. Mr. Hoke heads the executive committee, an elective position, and also is ex-officio member of each standing committee.

•

Sahara Erects New Washhouse

Sahara Coal Co. is building a new washhouse for the supervising personnel of its properties at Bankston Creek, Ill. These consist of strip mine No. 6, slope mine No. 5, directly under the stripping, and the washery that serves both. The character of this new building indicates the atmosphere of permanence that pervades this entire modern coal-producing plant.

•

Soft-Coal Accident Fatality Rate Wanes; Higher for Hard

Accidents at coal mines of the United States caused the deaths of 55 bituminous and 16 anthracite miners in June last, according to reports furnished the U. S. Bureau of Mines by State mine inspectors. With a production of 32,640,000 net tons, the accident death rate among bituminous miners was 1.69 per million tons, compared with 2.25 in the corresponding month of 1939.

The anthracite fatality rate in June last was 3.66, based on an output of 4,366,000 tons, against 2.20 in June, 1939.

For the two industries combined, the accident fatality rate in June last was 1.92, compared with 2.25 in the sixth month a year previous.

Fatalities during June last, by causes and States, as well as comparable rates for the first six months of 1939 and 1940, are shown below:

UNITED STATES COAL-MINE FATALITIES IN JUNE, 1940, BY CAUSES AND STATES

	Underground								Opencut and Surface					
State	Falls of roof	Haulage	Gas or Dust Explosions	Explosives	Electricity	Other Causes	Total Underground	Persons Falling Down shafts	Mine Cars	Railway Cars	Electricity	Other Causes	Total Surface	Grand Total
Alabama	2	1	..	..	..	..	3	..	..	..	..	..	..	3
Illinois	..	1	..	..	..	..	1	..	..	..	..	..	..	1
Iowa	1	..	..	..	..	..	1	..	..	..	..	..	..	1
Kentucky	8	2	..	..	2	..	12	..	..	..	..	1	1	13
Ohio	..	..	1	..	..	..	1	..	..	..	..	..	..	1
Oklahoma	..	..	..	..	..	1	1	..	..	..	..	..	..	1
Pennsylvania (bit.)	8	1	..	..	1	..	10	..	1	1	..	1	3	13
Tennessee	..	1	..	..	..	..	1	..	..	..	..	..	..	1
Virginia	1	..	..	..	..	..	1	..	..	..	..	..	..	1
Washington	..	1	..	..	..	..	1	..	..	..	..	..	..	1
West Virginia	11	6	..	..	..	..	17	..	..	..	2	..	2	19
Total (bituminous)	31	13	1	..	3	1	49	..	1	1	2	2	6	55
Pennsylvania (anthracite)	6	4	..	2	1	1	14	1	1	..	..	..	1	16
Grand total	37	17	1	2	4	2	63	1	2	1	2	2	7	71

FATALITIES AND DEATH RATES AT UNITED STATES COAL MINES, BY CAUSES*

January-June, 1939 and 1940

	Bituminous				Anthracite				Total			
	Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons		Number Killed		Killed per Million Tons	
Cause	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940	1939	1940
Underground:												
Falls of roof and coal	204	241	1.268	1.094	58	54	2.142	2.159	262	295	1.394	1.203
Haulage	64	94	.398	.427	10	22	.369	.879	74	116	.394	.473
Gas or dust explosions:												
Local	3	7	.190	.032	1	2	.037	.080	4	9	.021	.037
Major	...	163	.....	.740	....	...	.....	.....	....	163	.....	.664
Explosives	6	12	.037	.054	10	5	.369	.200	16	17	.085	.069
Electricity	20	10	.124	.045	1	5	.037	.200	21	15	.112	.061
Machinery	11	14	.068	.064	1	1	.037	.040	12	15	.064	.061
Shaft	3	1	.019	.004	4	2	.148	.080	7	3	.037	.012
Miscellaneous	4	13	.025	.059	8	3	.295	.120	12	16	.064	.065
Stripping or opencut	4	5	.025	.023	3	2	.111	.080	7	7	.037	.029
Surface	12	22	.075	.100	11	5	.406	.200	23	27	.123	.110
Grand total	331	582	2.058	2.642	107	101	3.951	4.038	438	683	2.331	2.784

*All figures subject to revision.

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Magnet Wire

Locomotive Reel Cable

Weatherproof Wire

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Mine Entry Cable

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IF IT'S ELECTRICAL WIRE OR CABLE **ROEBLING** HAS IT!

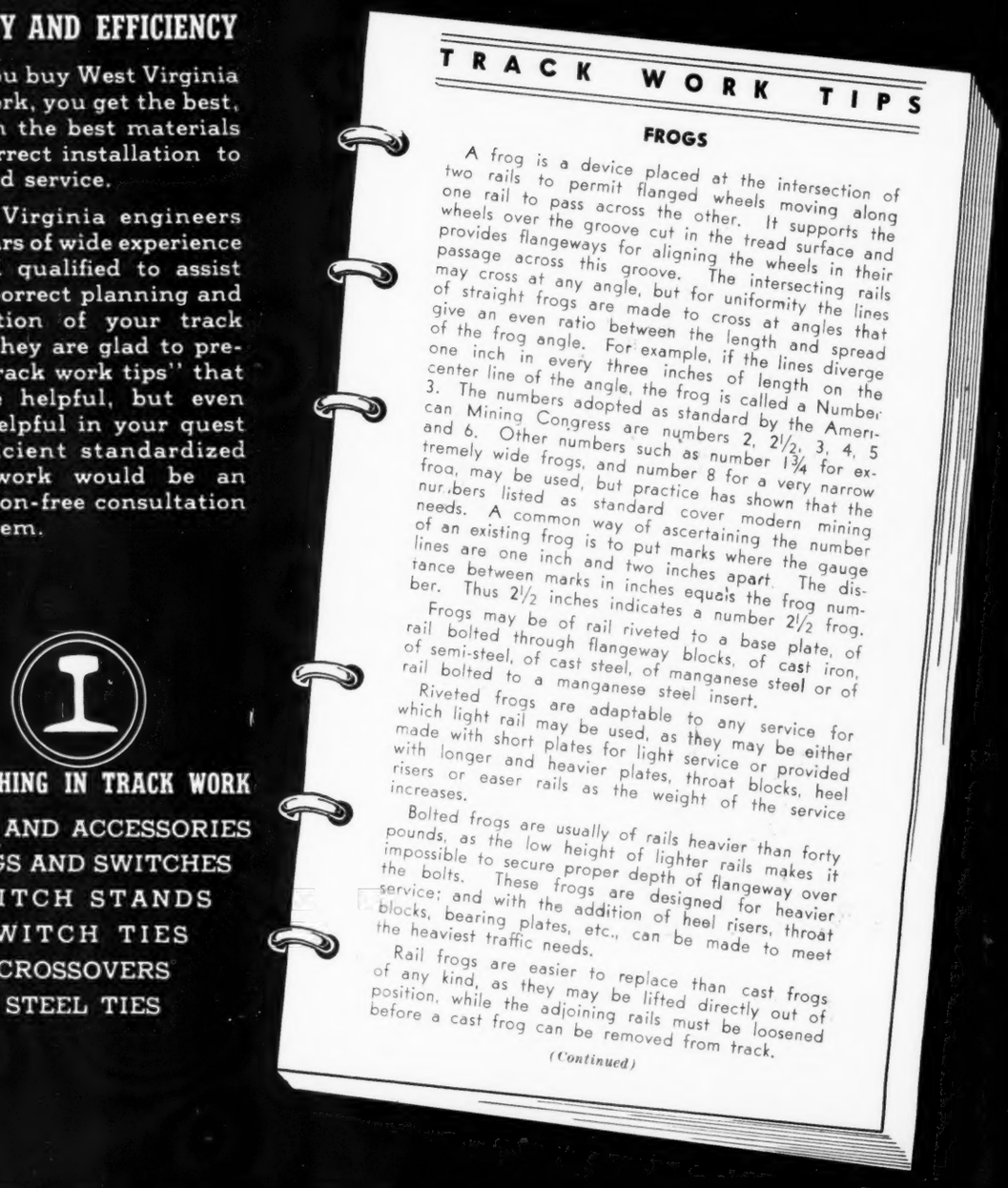
WEST VIRGINIA TRACK EQUIPMENT

Plus Improved Track Work Practice

... A COMBINATION THAT ASSURES YOU MAXIMUM ECONOMY AND EFFICIENCY

When you buy West Virginia track work, you get the best, but even the best materials need correct installation to give good service.

West Virginia engineers with years of wide experience are well qualified to assist you in correct planning and installation of your track work. They are glad to present "track work tips" that may be helpful, but even more helpful in your quest for efficient standardized track work would be an obligation-free consultation with them.


TRACK WORK TIPS
FROGS
A frog is a device placed at the intersection of two rails to permit flanged wheels moving along one rail to pass across the other. It supports the wheels over the groove cut in the tread surface and provides flangeways for aligning the wheels in their passage across this groove. The intersecting rails may cross at any angle, but for uniformity the lines of straight frogs are made to cross at angles that give an even ratio between the length and spread of the frog angle. For example, if the lines diverge one inch in every three inches of length on the center line of the angle, the frog is called a Number 3. The numbers adopted as standard by the American Mining Congress are numbers 2, 2½, 3, 4, 5 and 6. Other numbers such as number 1¾ for extremely wide frogs, and number 8 for a very narrow frog, may be used, but practice has shown that the numbers listed as standard cover modern mining needs. A common way of ascertaining the number of an existing frog is to put marks where the gauge lines are one inch and two inches apart. The distance between marks in inches equals the frog number. Thus 2½ inches indicates a number 2½ frog.
Frogs may be of rail riveted to a base plate, of rail bolted through flangeway blocks, of cast iron, of semi-steel, of cast steel, of manganese steel or of rail bolted to a manganese steel insert.
Riveted frogs are adaptable to any service for which light rail may be used, as they may be either made with short plates for light service or provided with longer and heavier plates, throat blocks, heel risers or easer rails as the weight of the service increases.
Bolted frogs are usually of rails heavier than forty pounds, as the low height of lighter rails makes it impossible to secure proper depth of flangeway over the bolts. These frogs are designed for heavier service; and with the addition of heel risers, throat blocks, bearing plates, etc., can be made to meet the heaviest traffic needs.
Rail frogs are easier to replace than cast frogs of any kind, as they may be lifted directly out of position, while the adjoining rails must be loosened before a cast frog can be removed from track.
(Continued)

EVERYTHING IN TRACK WORK

RAILS AND ACCESSORIES
FROGS AND SWITCHES
SWITCH STANDS
SWITCH TIES
CROSSOVERS
STEEL TIES

THE WEST VIRGINIA RAIL CO.

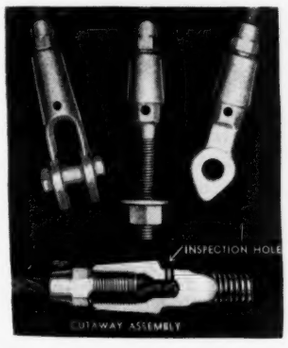
HUNTINGTON WEST VIRGINIA

WHAT'S NEW IN COAL-MINING EQUIPMENT

WIRE-ROPE CONNECTOR

Electroline Co., Chicago, offers the improved Electroline-Fiege wire-rope connector of vibration damping design. It grips the cable with graduated compression, feathering off from maximum at the rear to zero at the front. This design prevents "weak point" crystallization at the point of connection and thus insures longer rope life.

The connector is a compact, streamlined assembly of three simple units: a sleeve which slips over the end of the wire rope, a tapered plug which is inserted to separate and hold the strands of wire in the sleeve, and a covering socket which securely locks the cable. Installation may be made with ordinary mechanic's tools—and no hot metal is required. A feature of the connector is an "inspection hole" which enables the workman to see at a glance the twist joint.

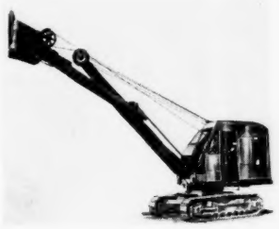


For rope sizes of ¾ in. and larger, the standard connector is available in black hot-galvanized and cadmium-plated finishes. For rope sizes ¾ in. and smaller, the industrial connector is available in black hot-galvanized and cadmium-plated steel, also in bronze, stainless steel and Monel metal.

•

SHOVEL-DRAGLINE-CRANE

A new, powerful, full-size ½-yd. convertible shovel-dragline-crane, Model LS-60, is offered by Link-Belt Speeder Corporation, Chicago. Claimed for the new model are several advancements, including self-aligning roller bearings on drum shafts, reverse shaft and main power shaft; a new safety-type rapid boom-hoist for crane duty, with conventional worm-geared boom-hoist optional; fully inclosed traction gears running in oil; double fully inclosed traction brakes controlled from the cab; a 56-in. machine-finished roller path turntable with roller-bearing "hook" rollers; interchangeable clutches on drum, swing, retract and boom hoist; welded steel design for strength and resistance to shock load and to provide positive alignment of machinery parts; glass all around in operator's cab.



The engine is 60 hp., gasoline or diesel; track shoes are 16 in. standard, of the lug-driven type, or Caterpillar tractor-type crawlers can be furnished.

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TAMPING

A prepared stemming material — called Calcot tamping — designed and manufactured specifically to meet underground conditions where blasting is done in drilled holes is offered by California Cotton Mills Co., Oakland, Calif. Uniformity and efficiency are claimed for it, the soft, spongy, airtight seal made by it confining the disrupting gases momentarily, causing complete detonation of the powder. The maker also states that it is fireproof, soft; cannot damage fuse or wires; will not freeze, dry out, or gather excessive moisture; is light, convenient, easy to use, and non-clogging.

•

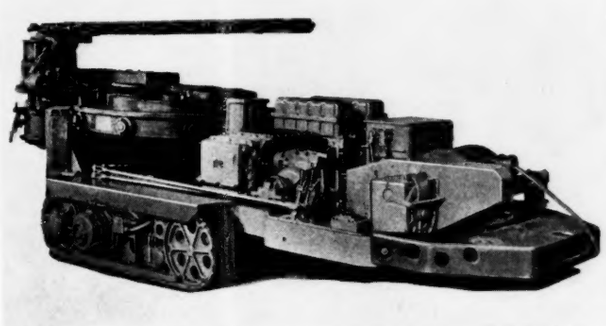
HYDRAULIC SCRAPER

A new two-wheel hydraulic scraper—the H-28—built for use with tractors rated at 25 to 35 hp. is announced by Bucyrus-Erie Co., South Milwaukee, Wis. It has a struck capacity of 2½ cu.yd., but, according to the manufacturer, will heap to loads of 3 or 4 cu.yd. It operates on a safe low-pressure hydraulic system, has the exclusive Bucyrus-Erie "double-curve" cutting edge, and dumps backward and behind its wheels like a dump truck.

•

MACHINE CATS

A motorized caterpillar mounting adapting any universal type cutting machine to trackless mining is offered by the Joy Mfg. Co., Franklin, Pa. Each of the caterpillars is equipped with its own motor. Contactors control motor operation in both steering and straightaway tramming.



AIR HOSE

Designed especially for heavy-duty pneumatic-tool service is Goodyear Tire & Rubber Co.'s new Red Wing air hose. Introduced by the company's Mechanical Goods Division (Akron, Ohio), Red Wing hose is composed of three principal components:

The tube is of non-porous rubber, resistant to action of hot and cold air. Lubricants in the air will not cause swelling or flaking, obviating clogging of tools with rubber particles.

Reinforcement is provided with three plies of multiple-braided, special cabled cotton yarn, providing a high safety factor for working pressures and high resistance to blows and impacts.

The cover is a heavy gage of soft red rubber with a high tensile strength, providing utmost resistance to cutting from rocks, ore or other materials. It likewise is abrasion- and sun-resistant. The hose is available in ½-, ¾- and 1-in. sizes.

•

WOOD-PROTECTIVE TREATMENT

"Permodip," introduced by E. & F. King Co., Inc., Boston, Mass., is a treatment for wood products said to help overcome dry rot, fungus decay, sap stain, grain raising, and termite destruction, as well as to be effective in eliminating rattling windows, sticking doors, warping floors, etc., by controlling the moisture content of wood, which causes shrinking and swelling.

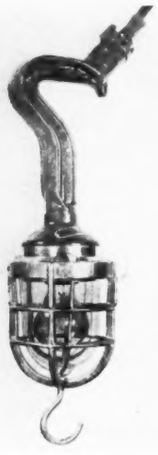
Four toxic materials employed in compounding Permodip perform separate functions, yet are

said to be so balanced that they produce no crystallization on the surface of the wood, but, on the contrary, act as an effective primer on surfaces which are to be painted. The manufacturer states that these toxics were selected on the basis of their permanency, insolubility, effectiveness, low degree of toxicity to human beings, ease of application, low leaching and low cost.

•

EXPLOSION-PROOF EXTENSION LAMP

An explosion-proof extension lamp of 100-watt capacity with Underwriters' listing, for use anywhere explosive vapors may be lurking, is announced by the Stewart R. Brown Mfg. Co., New York City. With a safety grip of molded plastic (high-impact macerated canvas) that effectively insulates heat, extra heavy sparkproof hook and guard, au-



tomatic circuit breaker that shuts off the current if the globe breaks, one-piece guard that must be in place before it will light, this lamp is said to have 2½ times the light capacity of any other portable lamp of equal weight ever before listed by the Underwriters.

•

HARD FACING ELECTRODES

Two new hard facing electrodes, known as "Faceweld No. 1" and "Faceweld No. 12," are offered by Lincoln Electric Co., Cleveland, Ohio. These are cast abrasion-resisting alloys used for hard-facing by the metallic arc process. Both are coated, have exceptionally good arc characteristics and produce a smooth, dense deposit. Deposits are very resistant to abrasion, says the manufacturer, but not excessively hard and brittle. "Faceweld" bonds well with all types of ferrous alloys.

No. 1, the softer and tougher, has good abrasion resistance and very high resistance to impact for this class of material; it is used for surfacing digger teeth, scarifiers, grader blades, etc., by arc-welding. No. 12, somewhat harder, has superior resistance to abrasion; applications include screw conveyors, conveyor sleeves, plows, gyratory crushers, power shovel and dragline bucket parts, dredge pump impellers and casings, coal-pulverizing jaws, crusher roll plates, etc.

•

ALL-WHEEL-DRIVE TRUCK

A short-coupled medium-weight all-wheel-drive truck to be used for semi-trailer work is offered by Marmon-Herrington Co., Inc., Indianapolis, Ind. The unit is a standard Ford 101-in. wheelbase cab-over-engine model converted to all-wheel-drive in the Marmon-Herrington factory. The short wheelbase provides an unusually short turning radius; all-wheel-drive traction and power give the ability to climb steep hills and grades and insure performance in soft or slippery footing; cab-over-engine design permits good load balancing, uniform traction and low tire wear.

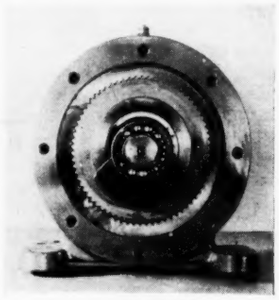
•

POWER CRANE

A new Supercrane for which unusual lifting capacity is claimed has been introduced by the General Excavator Co., Marion, Ohio. Mounted on a unit wheel mounting especially designed for it, the Supercrane will lift and swing a load of 6,000 lb. in a full circle—50 ft. from the machine—without danger of tipping or breakdown, according to the manufacturer. A ¾-yd. unit, it is said to have the stability of a 1½-yd. crane. The basic structure of the dual-tire wheel mounting is engineered of 20-in. I-beams running the full length of the carriage, and is designed to support 100 tons dead weight. It is self-propelling, requires only one engine, one operator, and one set of controls.

COMPACT SPEED REDUCER

Bard Foote Gear Works, Cicero, Ill., offers a new speed reducer, compact in size, which develops high-ratio speed reductions without the use of large gears or drives. A double spur or combination spur and internal gear, ball-bearing mounted on drive shaft eccentric, meshes with a stationary internal gear. In mesh with the sec-



ondary gear is either a spur or internal gear which is solid and concentric with the output shaft. Eccentric drives initial spur around pitch line of the stationary internal gear. Since initial spur and secondary gear are solid, the speed of the latter is controlled by ratio between initial spur and stationary gear.

To obtain large ratios, a small difference in number of teeth between spur gear and internal gear is used. This makes the pitch line of the spur almost conform to that of the internal gear. Thus a large number of teeth are engaged, increasing the load-carrying factor. Efficiencies of this design range between 70 and 90 per cent, with reduction ratios from 20:1 to 7,500:1.

•

PAGE PROTECTOR

Announcement of a new clear, transparent, waterproof, long-lasting "page protector" manufactured of Pliofilm is made by Protex Products Co., Jersey City, N. J. Designed to preserve important papers, documents, photographs, etc., which are subjected to frequent handling, the page protectors give protection without bulk. This feature makes it possible to cover every page in a large ring binder if desired, without seriously increasing the over-all thickness of the binder's contents.

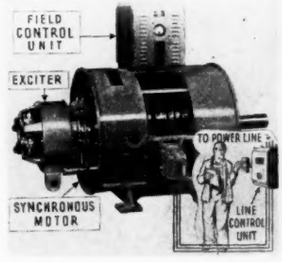
Pliofilm, a rubber hydrochloride produced by Goodyear Tire & Rubber Co., is a strong, tear-resistant sheet of material of crystal clear transparency. It also is water- and vapor-proof, and the Protex page protectors are made by heat-sealing the closed pages. The protectors easily slip over pages and are punched on the open ends so that they will fit binder rings or posts.

•

SYNCHRONOUS MOTOR

A new high-speed synchronous motor of "packaged" construction has been developed by Electric Machinery Mfg. Co., Minneapolis, Minn. This design, says the manufacturer, simplifies installation and wiring, reduces space requirements, and lowers first cost for the motor equipment; wiring on the job is the same as for a squirrel-cage induction motor. Need for a separate panel-type control has been eliminated.

The motor consists of: (1) a fabricated all-steel motor of new compact design; (2) an exciter, mounted on top of and V-belt driven by the motor, or direct-connected to the motor, and (3) a field-control unit, mounted on the motor, for automatically applying and removing excitation for the field winding of the synchronous motor. The exciter



and field-control unit are wired to the motor at the factory; thus the only wiring required on the job is between the synchronous motor and the line control unit, which can be an ordinary wall-mounted across-the-line or compensator-type induction motor starter. These motors are available up to 350 hp. at 1,800 r.p.m.

•

FLEXIBLE JOINT SEAL

A joint seal said to be completely resistant to propane, pentane, butene, benzol, gasoline, naphtha, grease and oils of all types has been introduced by the Glyco Products Co., Inc., New York City, after exhaustive tests by the company and outside commercial laboratories and users. Known as Glycoseal, this material is flexible, leakproof and non-cracking. It will not harden and joints may be broken easily without damaging the fittings. It can be used on rubber —which it does not attack—as well as all kinds of metal fittings.